C. S.
R

A
TREATISE
ON THE
Parallactic Angle,

Extracted from a LETTER to the late EARL of
MACCLESFIELD on that Subject.

To which is added

An APPENDIX:

CONTAINING A
COMPLEAT SET
OF
SOLAR and LUNAR Tables,
ENTITLED,
Tabulæ Dunelmenſes,
FOR
Computing the Places of thoſe Luminaries, both in,
and out of Syzigies.

> *Hic cæſtus, artemque repono.*
>
> VIRGIL.

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M.DCC.LXVI.

BRITISH MUSEUM

DEDICATION.

TO THE

Hon. George Townſhend,

Admiral of his Majeſty's Blue Squadron.

SIR,

WHEN I firſt reſolved to republiſh this ſmall Tract together with the Additional Lunar Tables, I determined at the ſame Time to offer it to your Acceptance. For no one has ſo good a Claim to my Services as yourſelf; nor any one more proper to judge of the *Utility* of ſuch a

Work, than *He*, who has ſpent moſt of his Time in the Sea-Service, and who has paſſed with Honour thro' all Degrees in the Navy to its higheſt Rank; and who from his great Experience cannot but know the Conſequence an accurate Knowledge of the LONGITUDE is to Navigation; and how far the LUNAR ASTRONOMY, above all other Methods, may be made conducive to that Diſcovery.

Whenever you are again called to Command, I ſhall be diſappointed in my Hopes, if you do not admit the DURHAM-TABLES to ſhare the Credit of having conduced to your own Preſervation and that of the Squadron you command, along with Mr. *Harriſon*'s TIME-KEEPER and the NAUTICAL EPHEMERIS.

Our mutual Friendſhip, and the near Relation I have the happineſs to ſtand in towards you, will teſtify the Sincerity with which I now ſubſcribe myſelf.

SIR,

Your moſt faithful,

May 1, 1766,

Humble Servant,

S. C.

PREFACE.

IT is now more than *ten* Years ſince the Letter on the PARALLACTIC ANGLE, inſcribed to the late EARL of MACCLESFIELD was laid before the Public. From that Time the Author has ſpent moſt of his leiſure Hours in purſuing his Attempt, then but *begun*, of improving the Lunar Theory; and in forming Tables ſo correct, as might anſwer all Purpoſes of the Aſtronomer in general, and of the Seaman in particular, by their nice Agreement with Obſervation.

Theſe Tables were communicated to Mr. HEATH, the Author of the ROYAL ASTRONOMER; a Perſon *perfectly* qualified to judge of the Correctneſs, as well as of the Utility of the Work, being himſelf an excellent *Computer*, and *practically* ſkilled in *Navigation*.

He approved of theſe Tables, and was deſirous to have them inſerted in his Book; which was readily complied with, and no Labour or Aſſiduity was wanting on the Author's Side to make them as ſerviceable to the Public as poſſible. And by their being put into Mr. Heath's hands, together with the *Comment* on the *Lunar Theory*, and *reviſed* by him before Publication, they had the farther Advantage of his Correcter Judgment, and quick Diſcernment, to give them the Accuracy, that the Author was deſirous they ſhould appear to have.

A Work ſo formed for Public Utility, and executed with ſo much Attention to it, the Compiler of the Tables had Hopes, would have met with a Candid Reception from all who pretended to *love* and *encourage Science*; but therein he met with *Diſappointment*. The *Royal Aſtronomer* was no ſooner publiſhed; but thoſe ſevere *Diſpenſers* of *Literary Rewards* and *Puniſhments* Meſs. the Reviewers, both Critical and Monthly, fell upon it without Mercy. Much they had to ſay, and much they did ſay on the *Want of Method*, a Miſtake in the conducting of the Work too viſible to be overlooked, and which the Author apologizes for in his Preface. And what true Criticiſm could not ſupply (for that requires a *deep Knowledge* in the Science they animadvert upon) *Scurrility* and *Ridicule* were at hand to ſerve them with: and herein they were exceedingly *fortunate*; for in *One* of the offending Perſons, they had not only an *Author* but a *Patron* alſo to make merry with: which they have done with ſo little *Decency* and *Diſcretion*

cretion; that the Prejudice they have intended his Character, and the Affront given to it, (the Fate of every illiberal Satyriſt) recoils upon themſelves, and but expoſes *their own* to the Public Cenſure, as being as deficient in Manners, as in good Senſe. But this Treatment would have ever remained *unnoticed* by the Author of theſe Sheets (who ever has held *Scurrility* and *Buffoonery* as *unanſwerable*) but that one of theſe Critics has caſually dropped a Suſpicion, that theſe TABLES were not *genuine*; a Suſpicion, which by others has been improved into a *Certainty*: and it has been confidently affirmed, that they were taken from Mr. *Mayer's Lunar Tables* publiſhed in the ſecond Volume of the *Gottingen Acts*. An Aſperſion too injurious to the *Moral* Character of the Author, to be overlooked. Some Account of this Matter is given at the Concluſion of the following Extract; and to that he refers the Reader. At preſent, he will only detain him, by offering his Reaſons for the preſent Publication.

The firſt Motive for it, is: That this ſmall Tract upon the Parallactic Angle, which he ſtill fondly hopes has been found to have its Utility, might be laid before the Public free of thoſe Errors and Inaccuracies, which the haſtineſs of the firſt Publication, and his Abſence from the Preſs, had occaſioned in the former Impreſſion. To which end, all the

Examples have been recomputed, and the Lunar Places calculated *de novo* from the Tables given in the Appendix.

Another Point in view was to give the Public, the Tables themſelves *correct*, and in ſome Degree *improved* ſince their Publication in the R. Aſtronomer.

But the principal Object, which engaged him in this Republication was to preſent the Aſtronomer with theſe *new Tables* for computing the Moon's Place in *Syzigies*; which for Conciſeneſs, as well as Correctneſs, he believes will excell all others, as *yet* publiſhed. And ſo prove no unacceptable Preſent to him.

If theſe Tables ſhould anſwer this Diſcription; as by many and frequent Trials, he has the greateſt Reaſon to think they will; he may hope that he will not be found to have done any Diſcredit to his *favourite* Science in laying them before the World. He offers, in them, his *beſt Service* to the Public, and claims only their *Attention* to this offering: deſiring alone, that no *preſuppoſed* Opinion of his *inſufficiency* in theſe Matters may draw them off from entering into a fair Examination of their Pretenſions. If hereafter theſe ſhould be exceeded by Tables more correct, (ſuch as *Mayer*'s Tables, now in Poſſeſſion of the Commiſſioners of Longitude, may be ſuppoſed to be) yet even *then* the Author is confident that the Public will be ſo juſt to think, that to have done *ſo much* will not be a work entirely void of *Merit*.

EXTRACT

FROM A

LETTER

ON THE

Parallactic Angle, &c.

ALTHOUGH, ſince the Revival of Letters in the Weſt, ENGLAND has ſtood foremoſt in the Rank of Learned Nations: Yet in no Branch of Science has ſhe been more diſtinguiſhed, as *excelling* than in that of ASTRONOMY.

The Eſtabliſhment of the ROYAL SOCIETY we may look upon as the Foundation of this Super-eminence; and the *Æra* of its Eſtabliſhment as the *Æra* of Science. From that Time to this the moſt eminent Geniuſes of the Kingdom devoted their

Time and directed their Studies to the Improvement of Natural Philoſophy, Mathematicks, and Aſtronomy. Hence our BARROW, our NEWTON, and our HALLEY. Names which no Nation beſides our own can boaſt of. To theſe all *Europe* ſtands indebted for that wide Field of Knowledge which now lies open, and is familiarly trod by every *Adept* in Science. But *Aſtronomy* more particularly engaged the Attention, and received its firſt great Improvement of *Halley* and *Newton*, who have immortalized their Names, by nothing more than by their attention to the *Lunar Aſtronomy* in particular. We owe to *Newton* a *Theory* of the *Moon's Motions* ſo nearly concurring with Obſervation, that what future Aſtronomers have done, has been but the finiſhing his Plan on the ſame unerring Foundation, the Theory of Gravity, aſſiſted by the better Obſervations of *Halley* and *Bradley*, to whom (to the extream Accuracy of *Bradley* in particular,) the preſent improved State of the Lunar Aſtronomy is chiefly owing.

The Deſign the great Dr. *Halley* purſued of making a compleat Set of Lunar Tables from his own Obſervations, he did not live to finiſh; having been appointed the ASTRONOMER ROYAL in the decline of Life. But he lived to finiſh what was *next* to the giving a perfect ſet of Lunar Tables: Such a Series of Obſervations, as that at all Times, by applying the Error of a former Calculation, after a Revolution of the Moon's Apogeon at the Diſtance of eighteen Years and upwards, in a ſimilar Situation of the Moon with the Sun, and with her Apogeon, the Errors of his Tables might be ſo corrected, as not to differ from Obſervation more than *one firſt Minute* of a *Degree*.

But later Improvements in Aſtronomy have rendered even this Aſſiſtance, uſeleſs.

Yet perfect as theſe Obſervations for correcting the Tables had made the Lunar Aſtronomy: The method of obtaining the true Longitude of the Moon from her viſible Place in the Heavens, was ſo perplexed with the Doctrine of *Parallax*, and that rendered ſo intricate and tedious by the common Method for obtaining the *Parallactic Angle* through the *Nonageſimal Degree*, that the Application of Lunar Obſervations to the finding the Longitude at Sea (The great purpoſe to which Dr. *Halley* directed the Study and Improvement of the Lunar Aſtronomy) was little practiſed till of late, if not wholly diſregarded by the Mariner.

It was to obviate this Difficulty which this part of Aſtronomy laboured under that the following Tract was drawn up and publiſhed—laying before the Public a conciſe and accurate Method of obtaining the *Parallactic Angle*, which ſhall render this part of Computation rather delightful than tedious to the Aſtronomer.

This Method, when carried into Practice, I judged of ſuch general Uſe to Aſtronomy, that I ventured to offer it to the late *Earl* of MACCLESFIELD for his Conſideration. With the ſame Opinion of it, I now offer it to the Public, as little doubting of their Candour, as of that noble Lord's to whom it was then addreſſed.

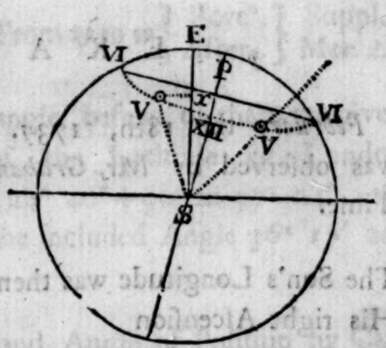
The Foundation of this Improvement had its riſe in the Method Sir *Chriſtopher Wren* diſcovered of conſtructing a Solar Eclipſe or Stellar Occultation geometrically; a Method infinitely advantageous to this Branch of Aſtronomy, and ſince generally preferred on Account of the tedious Calculation through the Nonageſimal Degree.

One of the principal Advantages derived from the Method of conſtructing Solar Eclipſes or Occultations geometrically, is, that we have the Phænomenon transferred from the Heavens to the Earth, and we ſee at one View the Progreſs of the Lunar Path over the Diſk, the Parallels it approaches to, or interſects; the Points of Interſection, and the Diſtance of any particular Place on the Globe from thoſe Points, as alſo the Longitudes and Latitudes of the Places, where the Lunar Shadow enters or leaves the Earth's Diſk; all which may be geometrically determined from the Projection. We have alſo in this Projection a Scheme of the Earth's Aſpect in Reſpect of the Sun or Star for the Time given; and can ſee repreſented to us, how every Place on the Hemiſphere before us deſcribes its own peculiar Path in its Paſſage over the Diſk, and in Reſpect of which the Sun or Star, on the Plane of whoſe univerſal Horizon the Projection is made, is ſeen to riſe, culminate, or ſet, according to the different Poſitions of the Place given on the Plane. The Angle too, which the Poles of the Earth, and the Ecliptic, make upon the Plane of the Horizon given, is repreſented as well as that which the Axis of the Ecliptic makes with a vertical Circle drawn through the Center of any particular Place. This Angle is the Complement of that, which, in ſpherical Trigonometry is called the parallactic Angle: And the Sides, which the Triangle ſubtends by ſtrait Lines, drawn from the Center of a given Place on the diurnal Path, one to the Center of the Diſk, and the other to the Axis of the Ecliptic, cutting it at Right-Angles, together with the intercepted Portion of the Axis of the Ecliptic; theſe form the Parallaxes in Altitude, Longitude and Latitude, and bear ſuch Proportion, as is well known to the whole Diſk, as the Parallaxes themſelves bear to the horizontal Parallax of the Moon in the Heavens.

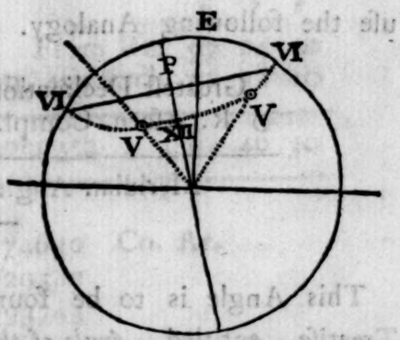
The having ſome Time ago this comprehenſive View before me in a Conſtruction of the late Solar Eclipſe; and obſerving that the parallactic Angle here, though ſo intricate and perplexed in the trigonometrical Calculation, was ſo clearly and ſimply laid down in the geometrical Conſtruction, being but a Part of a plain Right-Angled Triangle; of which, one Side, as well as the right Angle, was already known; I could not help forming ſome Hopes, that this Angle might be ſolved, and by it the whole Triangle, without the operoſe Method of inveſtigating the Altitude and Longitude of the 90th Degree thro' ſo many ſpherical Theorems as were neceſſary for that Purpoſe. Some Opportunities that offered of reconſidering this Point fully confirmed them; for I found, on examining carefully the projection before me, that the Angle ſought for was always either the Sum or Difference of thoſe Angles which are formed by the vertic Line of the

Place at the Center of the Diſk with the prime Meridian, and the Angle of the prime Meridian or Pole of the Earth with the Axis of the Ecliptic. Having thus far ſucceeded, I ſoon diſcovered that the Angle at the Center, or Angle of Poſition, might be obtained in the ſame Method of Calculation the Parallactic Angle is, when the Altitude and Place of the 90th Degree are given, with the Diſtance of the Moon from it; only aſſuming the Complement of the Moon's or Sun's Declination, inſtead of their Diſtance from the Pole of the Ecliptic: and that to, or from the Angle found, adding or ſubtracting the angular Diſtance of the Poles, as the Caſe required, would give the Angle whoſe Complement ſhould be the parallactic Angle ſought.

The very Conſtruction will ſhew, that when the North Pole is projected on the Eaſt Side of the Axis of the Ecliptic, if the vertical Line, paſſing through the Center of the Place given, is Weſtward of the Prime Meridian; that then the Angle ſought is the Difference of theſe Angles; that is, to ſpeak more intelligibly, when the Moon or Star is Eaſtward of the Prime Meridian; but when the Planet is Weſtward, or when (which is the ſame Thing) the Meridian of the Place lies to the Eaſtward of the Prime Meridian, then the Sum of the two Angles is the Angle ſought. The contrary is to be obſerved, when the Projection of the Axis of the Earth lies to the Weſtward, as may be better apprehended from the inſpecting of the ſmall Conſtructions



annexed, than from many Words. *Fig.* 1. repreſents the enlightened Hemiſphere with the Axis of the Earth inclined to the Eaſtward of the Axis of the Ecliptic. The Curve Line paſſing through VI. XII. VI. the Path of any given Place upon the enlightened Diſk for the Time given. VSP, and PSV, the angular Diſtance of the Place given at the Center of the Diſk from the Prime Meridian. VSx, and xSV, the Angles which are the Complement of the Parallactic Angle. In the firſt Inſtance, the Angle VSx is $VSP-xSP$. In the latter $PSV+xSP$.



In *Fig.* 2. where the Axis of the Earth is projected to the Weſtward of the Ecliptic Axis, the Reverſe is obſerved, and the Angle ſought VSx is $VSP+PSx$, and the Angle xSV is $PSV-PSx$.

I will ſubjoin here two or three Examples both in and out of Syzigies, for the better illuſtrating this compendious Method of Calculation; and for giving Satisfaction; that Compendious as it is; it can be, in no Inſtance, deficient in that exactneſs, which is required for the important Buſineſs of finding out the Longitude at Sea.

EXAMPLE

EXAMPLE I.

February the 18th, 1737. The Beginning of a Solar Eclipſe was obſerved by Mr. *Graham* in *Fleetſtreet*, at 2h 25′ 9″ App. Time.

		°	′	″
The Sun's Longitude was then	♓	11	6	28
His right Aſcenſion		342	34	50
— Declination South		7	24	40
The ☽'s Ecliptic Longitude by theſe New Tables	♓	11	11	2
Her Latitude North-Deſcending		0	38	9
The Time from Noon in Degrees equal to the Angle at the Pole		36	17	20

For the Angle of the two Poles, or its Comp. the Meridian Angle, uſe the following Analogy.

	R	°	′	
Greateſt Declination	S	23	29	9.600409
☉ R. Aſcen. Compl.	CS	17	25	9.979612
Meridian Angle	CS	67	39	9.580021

This Angle is to be found in the Table at the End of this Treatiſe, entitled, *Angle of the Hour Circle, &c.* by entering it with the *Sun*, *Moon* or *Stars* right Aſcenſion at the Time given.

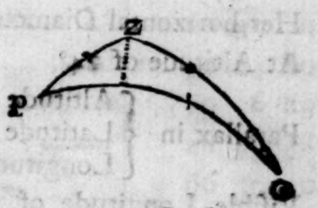
N. B. The Parallactic Angle is the Difference of the Angle of Poſition and of this Angle or of its Complement to 180 Degrees.

From ♋ to ♑ in the	Fore^{n}.	Mer. ∠	From ♑ to ♋	Fore^{n}.	Suppl.
	After^{n}.	Suppl.		After^{n}.	Mer. ∠

In the oblique angled ſpherical Triangle before us there are given the Sides ZP, the Complement of the Latitude of London 38° 28′; P⊙ the Sun's Declination 7° 24′ 40″+90° = 97° 24′ 40″, its Diſtance from the North Pole, and the included Angle 36° 17′ 20″ = the Angle at the Pole.

To find the Sun's Zenith Diſtance and Angle of Poſition by Caſe III. of oblique ſpherical Triangles.

Rad.		°	′	″	
CS	ZP⊙	36	17	20	9.906358
T	ZP	38	28	0	9.900087
T. 4th Arch		32	38	10	9.806445



	°	′	″
From P⊙	97	24	40
Subtr. 4th Arch.	32	38	10
Leaves 5th	64	46	30

Again:		°	′	″		
CS 4th Arch.	PR	32	38	10	0.074630	Co. Ar.
CS 5th	R⊙	64	46	30	9.629587	
CS	ZP	38	28	0	9.893745	
CS	Z⊙	66	39	20	9.597962	Sun's Zenith Diſtance.

For the Angle of Poſition. (by Caſe II.)

		°	′	″		
S	Z⊙	66	39	20	0.037091	Co. Ar.
S	ZP⊙	36	17	20	9.772217	
S	ZP	38	28	0	9.793832	
S	Z⊙P	23	38	30	9.603141	Angle of Poſition.

	°	′	″
From the Meridian Angle	67	39	0
Subtract the Angle of Poſition	23	38	30
Reſts the Parallactic Angle.	40	0	30

		′	″
The Moon's Horizontal Parallax to the Time given was		54	20
Sun's Horizontal Parallax			10
Horizontal Parallax ☽ à ⊙		54	10
Her horizontal Diameter		29	38
At Altitude of 24°		29	50
Parallax in Altitude ☽ à ⊙		49	42
Parallax in Latitude ☽ à ⊙		34	32
Parallax in Longitude ☽ à ⊙		35	45
Viſible Longitude of ☽	♓ 10	35	17
Viſible Latitude N.		3	37
Semidiam. ⊙ 16′ 8″ + viſ. Semidiam. at Alt. 24° ☽ 14′ 55″ =		31	3
Therefore ☽ in Antecedentia ⊙		30	50
By Calculation		31	3
Error		0	13

When the Parallactic Angle at the Moon is required, as when the true Diſtance of the Moon from the Sun or Star is ſought for, the apparent Diſtance being given: in this Caſe the Moon's R. Aſcenſion and Declination muſt be taken inſtead of the Sun or Stars into the Computation, which will render the Computation ſomething more prolix: But theſe may be had to a ſufficient Degree of Correctneſs by making uſe of the Tables of Equation of the Ecliptic R. Aſcenſion and Declination, Page 251 of the *Royal Aſtronomer*, computed by Mr. *Heath*, with a particular View of aſſiſting this Method of calculating the Parallactic Angle.

That the Accuracy of this new Method, and its Compendiouſneſs may appear to greater Advantage: I will ſubjoin the ſame Example, as calculated through the Nonageſimal Degree, with every Step neceſſary to the inveſtigating the Parallactic Angle by that Method.

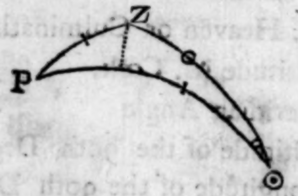
	°	′	″
Sun's Right Aſcenſion	342	34	50
Time from Noon in Degrees	36	17	20
R. Aſcenſion Med. Cœli.—360°	18	52	16
M. Heaven or Culminating Point ♈	20	26	4
Altitude M. Cœli.	46	31	10
Meridian Angle	67	39	0
Altitude of the 90th Degree at London	50	24	20
Longitude of the 90th Degree ♉	10	6	25
Sun from the 90th Degree	28	59	58
Zenith Diſtance	66	39	0
Parallactic Angle	43	59	30
Parallax in Longitude ☽ à ☉		35	46
Parallax in Latitude ☽ à ☉		34	31

EXAMPLE II.

The Beginning of the Solar Eclipſe *July* 14, 1748, was obſerved by Dr. *Bradley* at *Greenwich* at 9ʰ 4′ 30″ A. M.

	h	′	″
Sun's Longitude to the Time given ♌	2	37	16
------ R. Aſcenſion	124	55	0
------ Declination	19	36	0
------ Angle at the Pole	316	7	30
Complement = Angle at the Pole	43	52	30
Moon's Longitude by new Tables ♌	1	39	12
Latitude N. D.	0	35	37

Now, as in the former Caſe, from the Data above given we form the Oblique Spherical Triangle, wherein is given the Side ZP 38° 31′ (the Complement of Latitude of *Greenwich*) the Side P☉ 70° 24′ the Complement of Declination, and the included Angle at the Pole ZP☉ 43° 52′ 30″. For the Zenith Diſtance and Angle of Poſition.



Rad.						
CS	ZP☉	43	52	30	9.857847	
T	PZ	38	31	0	9.900864	
T	PR	29	50	40	9.758711	
CS	PR	29	50	40	0.061791	
CS	P☉	40	33	20	9.880683	
CS	ZP	38	31	0	9.893444	
CS	Z☉	46	44	10	9.835918	
S	Z☉	46	45	10	0.137746	
S	ZP☉	43	52	30	9.840788	
S	ZP	38	31	0	9.794308	☉'s Zenith Diſt.
S	P☉Z	36	21	0	9.772843	Angle of Poſition.
Merid. ∠		76	49	0		
Parall. ∠		40	28	0		

From	P☉	70	24	0
Subſt.	PR	29	50	40
Rem.	R☉	40	33	20

		°	′	″
The Moon's Horiz. Parallax to the Time given was	—	0	53	58
Sun's Parallax — — —				10
Horiz. Parall. ☽ à ☉ — —			53	48
Hence the Parallax in Altitude ☽ à ☉	—		39	11
Hence the Parallax in Latitude ☽ à ☉	—		25	26
Hence the Parallax in Longitude ☽ à ☉	—		29	48

Moon's

		°	′	″
Moon's Horiz. Diameter			29	26
The ſame at 47° Altitude			29	46
Diameter of the Sun		0	31	31
Semidiam. Sun + Moon at 47°		0	30	38
Viſible Latitude Moon			10	11
Moon in Antecedentia obſerved			28	54
Moon's Viſ. Longitude computed	♌	2	9	0
Moon's Viſ. Longitude obſerved	♌	2	8	27
Error Computi	+	0	33	

In Order to ſettle the Elements of this Method of Calculation more ſatisfactorily, I will add one more Example and that *extra Syzigias.*

EXAMPLE III.

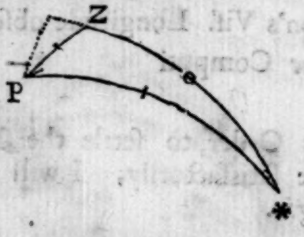
On *September* the 14th, 1717, there happened an Occultation of *Aldebaran.*

The Emerſion of that Star was obſerved in *Crane-Court, London,* at 9ʰ 58′ 20″ App. Time.

		°	′	″
The Sun's Longitude to the Time given was	♎	2	38	29
His Right Aſcenſion		182	25	24
Longitude of Aldebaran	♊	5	50	34
Latitude	S.	5	29	0
Declination, North		15	54	28
R. Aſcenſion of the Mid. Heaven		332	0	24
R. Aſcenſion of Aldebaran		64	56	13
Therefore the Angle at the Pole		92	55	49

In the oblique Spherical Triangle before us we have ZP, the Complement of the Latitude of LONDON 38° 28′ P*, the Complement of the Star's Declination 74° 5′ 32″, and ZP*, the Angle at the Pole 92° 55′ 49″. Its Complement 87° 4′ 11″.

To find the Star's Zenith Diſtance and Angle of Poſition.



Rad.						
CS	ZP*	87	4	10	8.708638	
T	ZP	38	28	0	9.900087	
T	PR	2	19	30	8.608725	
CS	PR	2	19	30	0.000358	
CS	R*	76	25	0	9.370808	
CS	Z	38	28	0	9.893745	
CS	Z*	79	23	40	9.264911	*'s Z. Diſtance.
S	Z*	79	23	40	0.007483	
S	ZP*	87	4	10	9.999432	
S	ZP	38	28	0	9.793832	
S	Z*P	39	12	6	9.800747	Angle of Poſition.
Comp. Mer. ∠.		99	33	22		
Parallact. ∠.		60	21	22		

	°	′	″
To P*	74	5	30
Add PR	2	19	30
Sum R*	76	25	0

		°	′	″
The Moon's Horizontal Parallax to the Time given		0	58	10
Hence her Paral. in Altitude			57	10
Hence her Paral. in Latitude	+		49	46
Hence her Paral. in Longitude	+		28	17
Her Horizontal Diam.			31	44
At 79° ⊙ Diſt.			31	56

Viſible

		°	′	″
Viſible Latitude of the Moon	S.	5	28	44
Differ. of Moon and Star's Latitude		0	0	16
Therefore the Moon ſeen in Conſequentia			15	57
Her viſible Longitude obſerved.	♊	6	6	31
Computed	♊	6	6	58
Error comput.		+	0	27]

Having extracted from this ſhort Treatiſe all that is neceſſary to illuſtrate this new Method of *inveſtigating* the *Parallactic Angle*; I ſhall proceed no farther in it. That Part of it, which relates to the perfecting the Lunar Theory, and the Method of computing her Place, by introducing the *Evection Equation* in the Room of the *Equation of the Apogeon*, being better and more fully illuſtrated in the Comment on that Theory, at the latter End of the *Royal Aſtronomer*: wherein that Method is ſhewn to be fully conſonant to the more *prolix Method* eſtabliſhed in Dr. *Halley*'s Improvement of *Horrox*'s Hypotheſis; the ſeveral Obſervations on the, *then*, imperfect State of the Lunar Aſtronomy more largely conſidered; and the Corrections of it, (at that Time but partially propoſed,) more clearly exemplifyed, and eſtabliſhed on the *Theory* of *Gravity*, and on true *Aſtronomical Principles*: and, laſtly, reduced to Practice, and brought to *proof* by no fewer than a *hundred* Examples computed from the Tables conſtructed on thoſe Elements; wherein the Difference of Computation from the obſerved Places of the Moon at a Mean do not amount to above *forty-four* Seconds of a Degree: (vid. R. Aſt. p. 373).

Referring the Reader to that Tract for farther Inſtruction, I ſhall now confine myſelf to the giving him all poſſible Satisfaction (as is promiſed in the Preface) relating to theſe Aſtronomical Tables; in order to remove that *injurious Suſpicion* caſt upon them, that they were *taken* or pirated from Mr. *Mayer's Tables*, as publiſhed in the ſecond Volume of the *Commentarii Gottingenſes*: Whereas, in truth, the Comment had been wrote, and the Tables, (computed from the Elements therein eſtabliſhed,) nearly compleated, *before* Mr. *Mayer*'s Tables were brought over to *England*; *at leaſt*, before they came to the Author's Knowledge. The Letter to the *Earl* of *Macclesfield* on the *Parallactic* Angle undoubtedly was publiſhed *before that Time*, wherein the ſame Method of introducing the Evection-Equation in the Place of the Equation of the Apogeon is laid down, and was, I believe, diſcovered by me much about the ſame Time, that Mr. *Mayer* may have hit upon the ſame Method of reſolving the Central Equation into two Parts: Not the only Diſcovery, which two Perſons have made at the ſame Time *unknown to each other*; as the Method for *conſtructing Solar Eclipſes geometrically* can teſtify.

The *Principles* on which this new Hypotheſis is eſtabliſhed being *the ſame* in *both*: It naturally follows that the *Tables* framed by the two different Authors muſt bear a great *Similarity* with each other. And undoubtedly they do: and that Similarity is rendered ſtill more conſpicuous by my having (to uſe Mr. *Heath*'s own Words) " *adopted* Mr. *Mayer*'s *conciſe Method* in the Conſtruction of theſe Tables." But they were not *originally* ſo conſtructed; and this conciſe Method was afterwards adopted *in deference* to Mr. *Heath's Judgment*, who preferred the increaſing the Number of Equations, to the Method I had before purſued, of correcting the annual Equation, the Evection Equation and Variation by *Logiſtical Logarithms*, or *decimal Multipliers* expreſſive of the *Ratios* of thoſe *leſs Equations*, as in the Example given Page 29, of the Letter to *Lord Macclesfield*, and as it is ſtill made uſe of in the Table of *Variation*, Page 51, of the *Royal Aſtronomer*, and now in the ſame Table at the End of this Treatiſe.

Soon after my Publication of this Letter on the Parallactic Angle; being ſtill intent on perfecting my Deſign (*then* ſcarcely begun) of giving ſuch Elements of the Lunar Aſtronomy, that a correct and compleat Series of Lunar Tables might hereafter be conſtructed from them; I drew up the Comment upon the Theory: At firſt, indeed, for the *private Amuſement* of a moſt *valuable Friend*, an able *Mathematician*, and much delighted with *Aſtronomical* Studies, in which, to an extream old Age he ſpent much of his leiſure Hours, with an *Aſſiduity* ſeldom found in Men of much younger Years. It being at that Time not deſigned for publication; it was drawn up in as eaſy and as popular a Manner as poſſible; and much in the *Form* that Mr. *Whiſton* has publiſhed his Remarks on Sir *Iſaac Newton*'s Theory, at the Concluſion of his *Aſtronomical Lectures*. The Deſign of computing Tables from theſe Elements was *ſubſequent* to this Time, and ſet aſide again, when far advanced, by the Death

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of that worthy Friend, for *whoſe uſe* they were intended; and by *whoſe Encouragement* they were begun.

I afterwards, as I have before mentioned, communicated my Intention to finiſh and make them public along with the Comment, to Mr. *Heath*; and that Gentleman requeſted they might make Part of his deſigned Treatiſe on *Aſtronomy*, *Chronology*, and *Navigation*. Knowing him to be a perfect Judge of this Subject, and that his Reputation as an able Aſtronomer was well eſtabliſhed, I thought theſe Tables could not be more happily introduced to the Public, than by being connected with a Work of that *Utility*, as the *Royal Aſtronomer*: I renewed immediately my Application, and devoted all the leiſure Time I had to this *one* Endeavour of making theſe Tables as *perfect* and as *uſeful* as poſſible; in which I had much Aſſiſtance from this Gentleman. Every Equation in theſe New Tables was repeatedly brought by myſelf to the *Teſt*, by the *Recomputation* of the *hundred Places*, as often as Occaſion required, and which now ſtand in the Royal Aſtronomer as a ſure *Teſt* of their *Correctneſs*: They being ſelected on purpoſe to compare the computed Places with the obſerved in every Aſpect of the *Moon with the Sun*, and *his Apogeon*; and with *her own Apogeon* and *Node*. A Work of much Labour, as well as Time; and which I might have well ſpared, if I had meant to *have availed myſelf of the Labours of another Perſon*.

But as the Averment of a Truth carries with it no more Weight than its own Probability, and the *Character* of the Perſon, and Opinion of his *Veracity*, will ſupport; and has not *all* the force required on the Occaſion, without it is ſtrengthened by *collateral* Circumſtances: ſo it is neceſſary to add ſomething of *this* Kind alſo to what has been already ſaid.

The firſt Circumſtance which occurs to take off from that Prejudice which the Similarity of the Tables has occaſioned (though the Time of Publication, as before obſerved, is ſufficient to overthrow all ſuch ſuſpicion) is—That though theſe and the *Gottingen-Tables* have that Similarity, which being conſtructed on the like Elements would naturally give them; yet, as the Method of applying the Evection Equation is founded on a Difference in the Hypotheſis; ſo the Application of it differs in each Author. That Epicycle, in which Dr. *Halley* ſuppoſes the Center of the Moon's Orbit to be carried round, ſubtends that Angle, which, according to *my* Hypotheſis, forms the Evection-Equation, and the Argument of that Equation is conſequently deduced from the Moon's *Eccentric Anomaly*. But, according to Mr. *Mayer*, this Epicycle is placed at the *upper* Focus of the Elliptic Orbit, and of Courſe the Argument of this Equation in *his* Tables is taken not from the *Eccentric*, but the *Mean Anomaly corrected*. In conſequence of this Difference in the ſeveral Hypotheſis, the Correction of this Equation, according to the Moon's Anomaly or Diſtance from the Earth, is *differently* applied: In *Mayer's Tables* it is flung almoſt intirely into the **Variation*; but in the *Royal Aſtronomer* divided betwixt *that* and the firſt *Semiannual Equation*.

C 2 I ſhall

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* The deduction of the difference of the Mean, and greateſt or leaſt Reduction from the *Compound Variation*, ſhould be, in juſtice acknowledged, as an Improvement taken from Mr. *Mayer's Variation Table*.

I ſhall not inſiſt on the ſeveral *Maxima* of the Equations having *different Magnitudes*; as that Circumſtance to a prejudiced Perſon may appear only as an *Artifice* to diſguiſe the *Plagiariſm:* as might alſo different Arguments given to Equations one and the ſame with thoſe in *Mayer*'s: as that of Evection + ☉'s Anomaly is the ſame as *Mayer*'s Argument — 2 ☽ à ☉ + ☉ Anomaly — ☽'s Anomaly; and ſo of one or two more. But I will mention the *different Number* of the Equations in each Tables, as *an undeniable* Confutation of this *Suſpicion*; if not as a *Circumſtance* of *Preference*; as the fewneſs of Equations are not only an *Eaſe* to Computation, but alſo leſs liable to occaſion *Error*.

I have alſo very ingenuouſly laid before the Reader, the *Principles* on which I determined the *Maxima* of the ſeveral Equations; a Circumſtance Mr. *Mayer* has entirely paſſed over; contenting himſelf with ſaying, "that he had found out an "eaſy and elegant Method of reſolving the general Analytic "Equations, which the famous *Euler* had reduced the Theory to."

This candid Conduct ought to remove all Suſpicion; as I am confident it has, all Poſſibility of ſecreting the Plagiariſm. I might have, as moſt ignorant Pretenders to Science have done before, aſſumed an Air of Importance, and have denied the Learned Reader the Satisfaction he has a Right to demand. But he has to do with one who had rather expoſe his *Inability* to his View, than to impoſe upon him with *falſe*

Pretences to Knowledge. Within the Compaſs of this little Tract, and in that of the following Tables, I have laid before the Publick the whole Reſult of my Studies and Labours on this Subject; whether of *Utility* or not, the *Learned Aſtronomer* and experienced Navigator muſt be the final Judges. If theſe determine, that I NEITHER HAVE NOR CAN DO ANY THING,—I ſubmit to *their* Deciſion; and have only to regret, that I have, in ſo miſtaken a Manner, employed ſo *many* Years in the Study of a Science, I have ſo little underſtood. On the contrary; if Perſons, well qualified to determine, ſhould approve of what I have done, as conducive to the *Improvement* of *Aſtronomy*, or to the *Service* of *Navigation* in particular, I ſhall, in that Approbation, have received my full Reward—that inexpreſſible Delight which every honeſt Man feels, who, according to his Talents, have been of Service ſome Way or other to his Country.

So long an Apology for *that*, which I had no Suſpicion could have demanded *any*, I hope the Reader will be ready to excuſe, as *neceſſary* on ſo *intereſting* an Occaſion. I will now endeavour to make ſome Amends, by giving all Satisfaction he can require, as to the Conſtruction of the following Tables; particularly of *them*, which are conſtructed for finding the Moon's Place in the *Conjunctions*, and *Oppoſitions*.

The Conſtructing the Central Equation of the Moon to her *true Anomaly*, or what is equal in *Syzigia*, to the *Sun's Argumentum Annuum*, is agreeable to Dr. *Halley's* Method. And ſimilar to his, the firſt Semiannual Equation of the Moon is involved in this Equation, as is alſo the Equation marked V. in the *Royal Aſtronomer*. To this Table alſo is added, a *Correction* of the Equation; *additive* in the *Conjunction* and *ſubtractive* in the *Oppoſition.*

The ſecond Semi-annual Equation, depending on the Sun's Diſtance on the Node, the Argument being the ſame with that of Latitude in *Syzigies*, is added to the Reduction. So that the Number of Equations, which are uſed in the Conjunctions, are not more than *five with* the Reduction, viz. Annual Equation of Mean Motion, Central Equation, Sir *Iſaac*'s ſecond Equation of the Center: Equation depending on the Sun's Aſpect with the Node and Apogeon, and the Reduction. The Annual Equation of the Moon's Apogeon is *doubled* in the *Conjunctions* to compenſate the *Omiſſion* of the Moon's Annual Equation in the Argument for the Central Equation; and alſo to be a further Correction of that Equation correſpondent to the Sun's Mean Anomaly.

I have followed both *Mayer* and Mr. *Maſkelyne* (the preſent Aſtronomer Royal) in uſing *half* the Annual Equation of the Apogeon for the Equation of the Node: the Error ariſing thence, (ſuppoſing the true Quantity of that Equation 9′ 21″ according to *Newton*,) not being above 9″ at any Time in the Moon's Latitude.

The Table of Latitude, all but the ſmall Equation depending on the Sun's Anomaly, which is *additional*, is tranſcribed *Literatim* from Dr. *Halley*'s. But the Tables of the *Sun*'s *Diameter*

Diameter, and *Hourly Motion*, as alſo thoſe of the *Moon's Diameter*, *Hourly Motion* and *Horizontal Parallax*, have all been corrected according to the lateſt and beſt Obſervations.

Depending, in the Conſtruction of theſe Tables in the Royal Aſtronomer, too much on Dr. *Halley*'s Numbers, particularly in regard to the *Moon's Horizontal Parallax* in *Syzigies*, which I held *unalterably* determined at all Times by the obſerved Parallax in the *Total Eclipſe* of the *Sun* in 1715, the *Parallaxes* in thoſe Tables are given *nearly* half a Minute too little. The *Mean Place* of the *Node* is alſo given, from the ſame Authority, *three Minutes* at the leaſt *too backward.*

Theſe Errors *combining*, occaſioned the Calculation of the late Solar Eclipſe of 1764, to bring the *Center* of the *Annular Shade ſeventy Miles* nearly too much to the *Weſtward*; and to repreſent the Eclipſe *Central* where it was obſerved ſcarcely *Annular*—A Subject of much *Mirth* and *Deriſion* to the *Philomaths* at that Time; and which expoſed Mr. *Heath* to much *unjuſt* Ridicule. The Error of Computation had its *Origin* in Dr. *Halley*'s Numbers, as I have juſt obſerved, and which any one may be convinced of, who compares our *Table* of *Parallaxes* with Dr. *Halley*'s, of which ſeveral Examples are given down the Side of that Table, and moſt of the Tables, which *De la Caille* and other of the *French* Aſtronomers made uſe of, erred *more* or *leſs* in the *Courſe* of the *Annular Penumbra*, making it reach *Weſtward* of *London* in all their Computations. The *Engliſh* Computers generally fell into the *ſame* Error; excepting Mr.

Witchell; who being favoured with the *Gottingen* Tables, (as I am informed,) by Dr. *Bliſs* (I mean that * *laſt finiſhed* Copy that Mr. *Mayer* had ſent over juſt before his Death) gave the Path and Direction of the *Weſtern* Limit of the Annular Penumbra with great *Preciſion*.

In Reſpect of the Times of the *Beginning*, *Middle*, and *End* of this Eclipſe; the Computation Mr. *Heath* publiſhed agreed the neareſt of any with Obſervation. I never had reaſon to hope, that in regard to the Latitudes, that the Tables ſhould be found to correſpond ſo *nearly* with Obſervation as in the computed Longitudes; ſince I had *few* Obſervations of Latitudes to compare with them later made than thoſe by *Flamſtead*, as publiſhed in his *Hiſtoria Cæleſtis*; and they being of the *Apparent* Latitudes, and requiring to be at all Times ſeperated from *Parallax*, it made the Operation ſo tedious, that I was diſcouraged from proceeding very far in that Inquiry. And it is much to be lamented, that neither Dr. *Halley*, in his Series of Obſervations made of the Moon's Longitude, nor Dr. *Bradley* after, in thoſe more accurate Ones he communicated to *Euler* and *Mayer*, did not alſo add the obſerved *Latitudes*; which if they had done, *theſe Tables* might, as well as *others*, have been more accurate in that Reſpect. Dr. *Halley*'s Table of Latitudes in Syzigies ſeem to agree *in general* pretty nearly with Obſervation: And the Correction I have ſubjoined to that Table, depending on the Sun's Anomaly, I hope will render them ſtill more perfect at all times.

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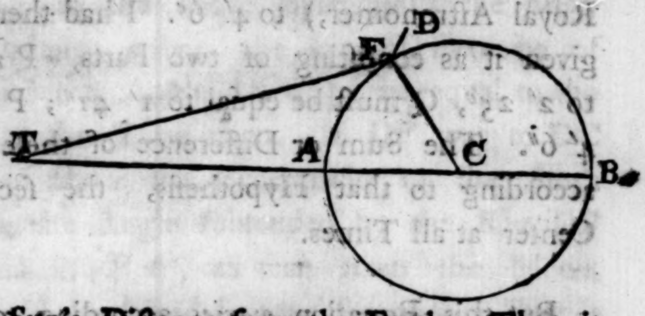
* Since the ſending this to the Preſs, Mr. *Witchell* has informed me, that it was not from the *laſt finiſhed* Copy, which he had not then ſeen, but from a former one, that he made his Computation of this Eclipſe.

The principal Alteration in the Tables, *extra Syzigia*, is in the *ſixth* and *ſeventh* Equations; the Reaſon of which I will endeavour to explain as clearly as poſſible.

In the 19th *Section* of the *Comment*, I have explained the Nature of that Equation, which Sir *Iſaac Newton* calls the *ſecond Equation* of the *Center*.

I ſhall not repeat here, what I have obſerved upon it in that place, farther than is neceſſary to explain, what regards the additional Table, annexed to *that* computed on *Newton's* Principles; and the Hypotheſis on which the preſent Alteration is eſtabliſhed.

"In the Perihelion of the Earth, when the Solar Force is greateſt; the Center of the Moon's Orbit moves *faſter* about the Center C, (vid. Fig.) than in the Aphelion, and that in the *Triplicate* Ratio of the Sun's Diſtance from the Earth: But at other Diſtances, becauſe of the Sun's Equation, included in the Annual Argument, the Center of the Orbit moves *faſter* in the Epicycle BFA in the *Duplicate* Ratio of the Sun's Diſtance from the Earth. That it might yet move faſter in its Epicycle BFA, and that in the *ſimple reciprocal* Ratio of thoſe Diſtances; Sir *Iſaac* tranſlates the Cen-



ter of the Orbit from F to D, making DF to FC, as twice the Eccentricity of the Earth's Orbit to its mean Diſtance, and the Sun's mean diurnal Motion from the Moon's Apogeon, to his Diurnal Motion from its own Apogeon: Or as 33 $\frac{7}{8}$ to 1000, and as 52′ 27″ 16‴ : 59′ 8″ 10‴ Conjunctly; or as 3 : 100, making the Angle DFC = the Complement of the Sun's Mean Anomaly DF to TC, as 35,2 to 5505, the Mean Eccentricity of the Moon's Orbit; ſubtending an Angle, as ſeen from the *Moon* at her *Mean* Diſtance from the Earth, of 1′ 12″ 30‴; the double of which Angle is 2′ 25″, Sir *Iſaac*'s ſecond Equation of the Center.

But our Author in this Computation gives us only that Equation which reduces that ariſing from the Sun's Central Equation, being twice involved in the Argumentum Annuum, to its due Proportion; being always *ſubductive* of it. The Equation generated in the *Triplicate* Ratio of the Sun's Diſtance is equal (as I have demonſtrated, page 409 of the Royal Aſtronomer,) to 4′ 6″. I had therefore in thoſe Tables given it as conſiſting of two Parts, P and Q. P being equal to 2′ 25″, Q muſt be equal to 1′ 41″; P + Q being equal to 4′ 6″. The Sum or Difference of theſe two Equations gave, according to that Hypotheſis, the ſecond Equation of the Center at all Times.

But this Equation *varies* according to the *variable Eccentricity* of the Moon's *Orbit*. And *Obſervation* determines, that, in *Syzigies*, when the Sun is in *Quadrature* with the Apſides of the Moon's Orbit (the Eccentricity then being the leaſt,) that it does not *exceed* the quantity Sir *Iſaac* has aſſigned it, of 2′ 25″. I therefore uſe *this* Equation only, in *Syzigies.* He, in his *Scholium* on the Lunar Theory, treats only of the ſeveral Equations *in Syzigia,* and the Method of obtaining the Moon's Longitude *at thoſe Times,* as is evident from his own Words which conclude the Scholium, which ſee! But tho' this Equation never exceeds 2′ 25″ in the *Conjunctions,* when the Sun is in quadrature with the Moon's Apſides; yet, when he is in *Conjunction* with the Apſides, and the *Eccentricity* of the Moon's Orbit the *greateſt*; *then* Obſervation determines it to be 4′ 6″, equal to the Equation generated in the *Triplicate* Ratio of the Sun's Diſtance from the Earth.

In order therefore to gain the true Proportion of this Equation at all Times, in every Aſpect of the Sun with the Apſides of the Lunar Orbit, and at every intermediate Diſtance of the Sun from the Earth; I ſuppoſe the Center of the Moon's Orbit revolving in the above Epicycle in the *ſimple* Ratio of the Sun's Diſtance only: the Line DF to be of a *variable* quantity; and the Angle DFC to be equal to the Sun's *Mean Anomaly* at the Time given. If DF was to DC *always* in proportion of *thrice* the Eccentricity to the Sun's mean Diſtance; then the Angle ſubtended by the Ray DF would *always* be equal to 4′ 6″, as ſeen from the Moon, and the Problem would be ſolved by *one* Equation. But as the Ratio of DF to FC is always *varying,* a *ſecond* quantity muſt be introduced to proportion the Equation to that Variation. I take therefore the *Mean* of the two Extreams for the *firſt* Part of the Equation, making P equal to 3′ 15″: and *half* their Difference for the *ſecond* Part Q. equal to 0′ 50″. And the reſpective Arguments of theſe Equations will be —of Equation P. *M. Evection — Sun's M. Anomaly*: of Equation Q. *M. Anomaly Moon — M. Anomaly Sun*, or *Arg. P.* + 2 *Argum. Annuum*. And thus ſhall the *ſecond Equation* of the *Center*, which is the *Sum* or *Difference* of theſe *two Equations* be obtained at all Times with the greateſt Accuracy.

But as I have ſeperated in this Hypotheſis, the *Sun's Equation* from the *Argumentum Annuum*; ſo muſt it be in the Computation: And the *Argument* of thoſe Equations depending on the *Diſtance* of the *Sun* from the *Moon's Apogee* be taken from the *Mean* Place both of *that* and of the *Sun*. Thus the *Argum. Annuum* is: *Mean Longitude Sun—Mean Longitude of the Moon's Apogeon*; as the *Table* in the *Appendix* directs for taking out the firſt *Semi-annual Equation* of the *Moon*; ſo no more needs be ſaid concerning it. The Difference that is cauſed in the Quantity of this laſt Equation is ſupplied alſo in the Annual Equation of the Apogeon: and is in itſelf an additional Correction of the ſecond Equation of the Center.

To the Table of Latitudes I have added the Correction of Latitude, depending on the Sun's Anomaly, and ſubjoined to the *Table* of *Latitude* in *Syzigy*. In theſe Tables it is called the *ſecond Equation* of *Latitudes*.

The Tables of *Mean Horizontal Parallax* to every Degree of the Moon's *M. Anomaly* is alſo *corrected* to agree with *Obſervation*.

And I have added, to compleat the Series of Tables, Mr. *Maſkelyne*'s of the *Hourly Motion* of the *Moon* to every Degree of her *Anomaly*; with the *Equations* of that Motion depending on the *Evection* and *Variation*: theſe Equations being the *hourly* Differences of thoſe other Equations according to their reſpective Arguments; as the hourly Differences of her Motion in the *Mean State* of her *Orbit* from her Mean Motion, is formed from the horary Difference of her Mean *Central Equation* in every Degree of her *Mean Anomaly*.

I have, now, left nothing *unnoticed*, that can explain the *Nature* of theſe Tables, the *Manner* of their Conſtruction, or the *Method* of computing from them; excepting that, which hereafter, for the Sake of the leſs experienced Computer, ſhall be laid down in the Precepts adjoyned to them. And thus having brought my deſigned Work to its *Concluſion*; which was to lay before the Public, in a *correct* Manner, all I have done, and perhaps all I *ſhall* do in the Science of Aſtronomy, or at leaſt, as to the *Lunar Aſtronomy*, the only Subject of theſe Papers; and having vindicated my *Name*, as I hope, ſatisfactorily, from the *ungenerous* Aſperſion of *Plagiariſm*: The Merit or Utility of it muſt be determined alone by the *able* Aſtronomer and Mariner; and to THEIR Judgment and Candour I leave it.

It might ſeem, that the Board of *Longitude* being in Poſſeſſion of the *corrected* Tables of the late Mr. *Mayer*, rendered ſuch an Attempt as *this* ſuperfluous: ſeeing too, that I was informed by Dr. *Bradley*, that the greateſt Error of thoſe Tables in *two* *hundred* Computations, compared with Obſervation *never* exceeded 56″ of a Minute. But both *theſe Tables*, and Mr. *Clairaut*'s, the French *Academician*, are rendered too difficult by their *numerous Equations*. * In particular M. *Clairaut*'s Equations are ſo numerous, and the Trouble of collecting the Arguments of thoſe Equations in Milleſimal Parts of a Degree ſo great, and ſo liable to *Error*: that, though in making all thoſe Equations *affirmative* Quantities, he has done all he can to *relieve* the Computer; yet I muſt ſo far beg leave to differ from Mr. *Martin*, his Tranſlator, as to obſerve, that if he does not feel the *Weight* of this Objection, it muſt be entirely owing to the great *Facility*, he handles theſe, and all other Computations.

I have nothing to ſet againſt theſe great Authorities in Favour of *my* Tables, but their Advantage of being more *conciſe*; and yet I hope, as *correct*. The *Conciſeneſs* of Computation is certainly of Advantage both to the Aſtronomer and Mariner, particularly to the *latter*; who is diſcouraged by long and intricate Calculations and whoſe *Situation* will not always *allow* of it. The Computation from theſe Tables in *Syzigia* is as *conciſe* and as *eaſy* as can be wiſhed. Their Method of Conſtruction has been long ſince given by Dr. *Halley*; but followed as I know of, by no *other* Aſtronomer. I had therefore this Field *open* to me for to offer *my* Service to the Public; and it leading to the ſame *End*, for which the Treatiſe on the *Parallactic Angle* was drawn up, I thought they might with great Propriety form *one* Tract. If I have in this Endeavour been ſerviceable to the Public, the Reputation thence gained is of the *beſt* Sort, and my utmoſt Intention is anſwered.

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* Mr. *Mayer* in his Tables has 14 Equations: and *Clairaut* no fewer than 21, for the Moon's Longitude *only*.

A Senſe of having directed our Abilities to a *Right* End; to *good* and *Beneficent* Purpoſes, alleviates much the Concern of failing in our Endeavours. On the other hand, when we are ſucceſsful: When we find that we have been *equal* to the Taſk, and that our Labours are brought to the *wiſhed for* Concluſion: Then the Senſe of a good *Intention* animates the Pleaſure ariſing from Public Approbation; for the Mind feels an *inward* Approbation, much more ſatisfactory to it than the greateſt *External* Applauſe; the Applauſe of a *good Conſcience*. This dilates the Heart, and fills it with Gratitude towards that BEING, from whoſe *Bounty* he derives the *Powers*, and *Diſpoſition* of doing Good; and thence gaining the *Praiſe* of Mankind.

" Quod ſpiro et placeo, (ſi placeo) TUUM EST.

Hor. Carm. B. IV. Od. 3.

APPENDIX.

TABULÆ DUNELMENSES.

BEING A

COMPLETE SET

OF

Solar and Lunar Tables

FOR

Computing the SUN and MOON'S PLACE, both in
and out of SYZIGIES,

AND

The *ſeveral Equations* for Each:

WITH

Precepts and *Examples* to illuſtrate and explain
the ſame.

BRITISH MUSEUM

Mean Radical PLACES of the SUN, APOGEE, and firſt Star of ARIES, from 1752 to 1852, New STYLE.

Gregorian Style.	M. Place ☉.				M.Pl. Ap.☉.				M.Pl. 1 * ♈			
	s	°	′	″	s	°	′	″	s	°	′	″
100 Yrs.	11	29	46	24	0	1	42	30	0	1	24	10
1652	9	10	44	49	3	6	54	15	0	28	18	55
B. 1752	9	10	31	13	3	8	36	45	0	29	43	5
1753	9	10	16	53	3	8	37	46	0	29	43	55
1754	9	10	2	33	3	8	38	48	0	29	44	46
1755	9	9	48	14	3	8	39	49	0	29	45	36
B. 1756	9	10	33	2	3	8	40	51	0	29	46	27
1757	9	10	18	42	3	8	41	52	0	29	47	10
1758	9	10	4	22	3	8	42	54	0	29	48	8
1759	9	9	50	3	3	8	43	55	0	29	48	58
B. 1760	9	10	34	51	3	8	44	57	0	29	49	49
1761	9	10	20	31	3	8	45	58	0	29	50	39
1762	9	10	6	11	3	8	47	0	0	29	51	30
1763	9	9	51	52	3	8	48	1	0	29	52	20
B. 1764	9	10	36	41	3	8	49	3	0	29	53	11
1765	9	10	22	21	3	8	50	4	0	29	54	1
1766	9	10	8	1	3	8	51	6	0	29	54	52
1767	9	9	53	42	3	8	52	7	0	29	55	42
B. 1768	9	10	38	30	3	8	53	9	0	29	56	33
1769	9	10	24	10	3	8	54	10	0	29	57	23
1770	9	10	9	50	3	8	55	12	0	29	58	14
1771	9	9	55	31	3	8	56	13	0	29	59	4
B. 1772	9	10	40	19	3	8	57	15	0	29	59	55
1773	9	10	25	59	3	8	58	16	1	0	0	45
1774	9	10	11	39	3	8	59	18	1	0	1	36
1775	9	9	57	20	3	9	0	19	1	0	2	26
B. 1776	9	10	42	9	3	9	1	21	1	0	3	17
1777	9	10	27	49	3	9	2	22	1	0	4	7
1778	9	10	13	29	3	9	3	24	1	0	4	58
1779	9	9	59	10	3	9	4	25	1	0	5	48
B. 1780	9	10	43	57	3	9	5	27	1	0	6	39
1781	9	10	29	37	3	9	6	28	1	0	7	29
1782	9	10	15	17	3	9	7	30	1	0	8	20
1783	9	10	0	58	3	9	8	31	1	0	9	10
B. 1784	9	10	45	47	3	9	9	33	1	0	10	1
1785	9	10	31	27	3	9	10	34	1	0	10	51
1786	9	10	17	7	3	9	11	36	1	0	11	42
1787	9	10	2	48	3	9	12	37	1	0	12	32
B. 1788	9	10	47	36	3	9	13	39	1	0	13	23
1789	9	10	33	16	3	9	14	40	1	0	14	13
1790	9	10	18	56	3	9	15	42	1	0	15	4
1791	9	10	4	37	3	9	16	43	1	0	15	54
B. 1792	9	10	49	26	3	9	17	45	1	0	16	45
1793	9	10	35	6	3	9	18	46	1	0	17	35
1794	9	10	20	46	3	9	19	48	1	0	18	26
1795	9	10	6	27	3	9	20	49	1	0	19	16
B. 1796	9	10	51	15	3	9	21	51	1	0	20	7
1797	9	10	36	55	3	9	22	52	1	0	20	57
1798	9	10	22	35	3	9	23	54	1	0	21	48
1799	9	10	8	16	3	9	24	55	1	0	22	38

SOLAR TABLES.

Gregorian Style.	M. Place ☉.				M.Pl. Ap.☉.				M. P. 1 * ♈			
	s	°	′	″	s	°	′	″	s	°	′	″
100 Yrs.	11	29	46	24	0	1	42	30	0	1	24	10
1652	9	10	44	49	3	6	54	15	0	28	18	55
1800	9	9	53	55	3	9	25	57	1	0	23	29
1801	9	9	39	35	3	9	26	58	1	0	24	19
1802	9	9	25	15	3	9	28	0	1	0	25	10
1803	9	9	10	56	3	9	29	1	1	0	26	0
B. 1804	9	9	55	44	3	9	30	3	1	0	26	51
1805	9	9	41	24	3	9	31	4	1	0	27	41
1806	9	9	27	4	3	9	32	6	1	0	28	32
1807	9	9	12	45	3	9	33	7	1	0	29	22
B. 1808	9	9	57	33	3	9	34	9	1	0	30	13
1809	9	9	43	13	3	9	35	10	1	0	31	3
1810	9	9	28	53	3	9	36	12	1	0	31	54
1811	9	9	14	34	3	9	37	13	1	0	32	44
B. 1812	9	9	59	23	3	9	38	15	1	0	33	35
1813	9	9	45	3	3	9	39	16	1	0	34	25
1814	9	9	30	43	3	9	40	18	1	0	35	16
1815	9	9	16	24	3	9	41	19	1	0	36	6
B. 1816	9	10	1	12	3	9	42	21	1	0	36	57
1817	9	9	46	52	3	9	43	22	1	0	37	47
1818	9	9	32	32	3	9	44	24	1	0	38	38
1819	9	9	18	13	3	9	45	25	1	0	39	28
B. 1820	9	10	3	1	3	9	46	27	1	0	40	19
1821	9	9	48	41	3	9	47	28	1	0	41	9
1822	9	9	34	21	3	9	48	30	1	0	42	0
1823	9	9	20	2	3	9	49	31	1	0	42	50
B. 1824	9	10	4	51	3	9	50	33	1	0	43	41
1825	9	9	50	31	3	9	51	34	1	0	44	31
1826	9	9	36	11	3	9	52	36	1	0	45	22
1827	9	9	21	52	3	9	53	37	1	0	46	12
B. 1828	9	10	6	40	3	9	54	39	1	0	47	3
1829	9	9	52	20	3	9	55	40	1	0	47	53
1830	9	9	38	0	3	9	56	42	1	0	48	44
1831	9	9	23	41	3	9	57	43	1	0	49	34
B. 1832	9	10	8	29	3	9	58	45	1	0	50	25
1833	9	9	54	9	3	9	59	46	1	0	51	15
1834	9	9	39	49	3	10	0	48	1	0	52	6
1835	9	9	25	30	3	10	1	49	1	0	52	56
B. 1836	9	10	10	18	3	10	2	51	1	0	53	47
1837	9	9	55	58	3	10	3	52	1	0	54	37
1838	9	9	41	38	3	10	4	54	1	0	55	28
1839	9	9	27	19	3	10	5	55	1	0	56	18
B. 1840	9	10	12	7	3	10	6	57	1	0	57	9
1841	9	9	57	47	3	10	7	58	1	0	57	59
1842	9	9	43	27	3	10	9	0	1	0	58	50
1843	9	9	29	8	3	10	10	1	1	0	59	40
B. 1844	9	10	13	57	3	10	11	3	1	1	0	31
1845	9	9	59	37	3	10	12	4	1	1	1	21
1846	9	9	45	17	3	10	13	6	1	1	2	12
1847	9	9	30	58	3	10	14	7	1	1	3	2
B. 1848	9	10	15	46	3	10	15	9	1	1	3	53
1849	9	10	1	26	3	10	16	10	1	1	4	43
1850	9	9	47	6	3	10	17	12	1	1	5	34
1851	9	9	32	47	3	10	18	13	1	1	6	24
B. 1852	9	10	17	36	3	10	19	15	1	1	7	15

Mean MOTIONS of the SUN and *fixed* STARS,

For MONTHS and DAYS.

Days.	JANUARY.						FEBRUARY.						MARCH.						APRIL.					
	M. Mot. ⊙.				Ap.	✱s.	M. Mot. ⊙.				Ap.	✱s.	M. Mot. ⊙.				Ap.	✱s.	M. Mot. ⊙.				Ap.	✱s.
	s	°	′	″	″	″	s	°	′	″	″	″	s	°	′	″	″	″	s	°	′	″	″	″
1	0	0	59	8	0	0	1	1	32	27	5	4	1	29	8	19	10	8	2	29	41	38	15	12
2	0	1	58	17	0	0	1	2	31	35	5	4	2	0	7	28	10	8	3	0	40	47	15	13
3	0	2	57	25	0	0	1	3	30	43	6	5	2	1	6	36	10	8	3	1	39	55	16	13
4	0	3	56	33	1	0	1	4	29	52	6	5	2	2	5	45	10	9	3	2	39	3	16	13
5	0	4	55	42	1	1	1	5	29	0	6	5	2	3	4	53	11	9	3	3	38	11	16	13
6	0	5	54	50	1	1	1	6	28	8	6	5	2	4	4	1	11	9	3	4	37	20	16	13
7	0	6	53	58	1	1	1	7	27	17	6	5	2	5	3	10	11	9	3	5	36	28	16	13
8	0	7	53	7	1	1	1	8	26	25	6	5	2	6	2	18	11	9	3	6	35	36	16	13
9	0	8	52	15	1	1	1	9	25	33	7	5	2	7	1	26	11	9	3	7	34	45	17	14
10	0	9	51	23	2	1	1	10	24	42	7	6	2	8	0	35	12	9	3	8	33	53	17	14
11	0	10	50	32	2	1	1	11	23	50	7	6	2	8	59	43	12	10	3	9	33	1	17	14
12	0	11	49	40	2	2	1	12	22	58	7	6	2	9	58	51	12	10	3	10	32	10	17	14
13	0	12	48	48	2	2	1	13	22	7	7	6	2	10	58	0	12	10	3	11	31	18	17	14
14	0	13	47	57	2	2	1	14	21	15	7	6	2	11	57	8	12	10	3	12	30	26	17	14
15	0	14	47	5	2	2	1	15	20	23	8	6	2	12	56	16	12	10	3	13	29	34	18	14
16	0	15	46	13	3	2	1	16	19	32	8	6	2	13	55	25	13	10	3	14	28	43	18	15
17	0	16	45	22	3	2	1	17	18	40	8	7	2	14	54	33	13	10	3	15	27	51	18	15
18	0	17	44	30	3	2	1	18	17	48	8	7	2	15	53	41	13	11	3	16	27	0	18	15
19	0	18	43	38	3	3	1	19	16	57	8	7	2	16	52	50	13	11	3	17	26	8	18	15
20	0	19	42	47	3	3	1	20	16	5	8	7	2	17	51	58	13	11	3	18	25	16	18	15
21	0	20	41	55	3	3	1	21	15	13	9	7	2	18	51	6	13	11	3	19	24	25	19	15
22	0	21	41	3	4	3	1	22	14	22	9	7	2	19	50	14	14	11	3	20	23	33	19	15
23	0	22	40	12	4	3	1	23	13	30	9	7	2	20	49	23	14	11	3	21	22	41	19	16
24	0	23	39	20	4	3	1	24	12	38	9	8	2	21	48	31	14	11	3	22	21	50	19	16
25	0	24	38	28	4	3	1	25	11	47	9	8	2	22	47	40	14	12	3	23	20	58	19	16
26	0	25	37	37	4	4	1	26	10	55	9	8	2	23	46	48	14	12	3	24	20	6	19	16
27	0	26	36	45	4	4	1	27	10	3	10	8	2	24	45	56	14	12	3	25	19	15	20	16
28	0	27	35	53	5	4	1	28	9	11	10	8	2	25	45	5	15	12	3	26	18	23	20	16
29	0	28	35	2	5	4	In Leap-Year for Jan. & Feb. take out for a Day sooner, both Styles.						2	26	44	13	15	12	3	27	17	31	20	16
30	0	29	34	10	5	4							2	27	43	21	15	12	3	28	16	40	20	16
31	1	0	33	18	5	4							2	28	42	30	15	12						

Mean

Mean MOTIONS of the SUN and *fixed* STARS,

For MONTHS and DAYS.

Days.	MAY.			JUNE.			JULY.			AUGUST.		
	M.Mot. ☉.	Ap.	✱s.	M. Mot. ☉.	Ap.	✱s.	M. Mot. ☉.	Ap.	✱s.	M. Mot. ☉.	Ap.	✱s.
	s ° ′ ″	″	″	s ° ′ ″	″	″	s ° ′ ″	″	″	s ° ′ ″	″	″
1	3 29 15 48	20	17	4 29 49 6	25	21	5 29 23 16	31	25	6 29 56 34	36	29
2	4 0 14 56	20	17	5 0 48 15	26	21	6 0 22 24	31	25	7 0 55 42	36	29
3	4 1 14 5	21	17	5 1 47 23	26	21	6 1 21 33	31	25	7 1 54 51	56	30
4	4 2 13 13	21	17	5 2 46 31	26	21	6 2 20 41	31	25	7 2 53 59	36	30
5	4 3 12 21	21	17	5 3 45 39	26	21	6 3 19 49	31	26	7 3 53 7	36	30
6	4 4 11 90	21	17	5 4 44 48	26	22	6 4 18 58	31	26	7 4 52 16	37	30
7	4 5 10 38	21	17	5 5 43 56	26	22	6 5 18 6	32	26	7 5 51 24	37	30
8	4 6 9 46	21	18	5 6 43 4	27	22	6 6 17 14	32	26	7 6 50 32	37	30
9	4 7 8 55	22	18	5 7 42 13	27	22	6 7 16 22	32	26	7 7 49 41	37	30
10	4 8 8 3	22	18	5 8 41 21	27	22	6 8 15 31	32	26	7 8 48 49	37	31
11	4 9 7 11	22	18	5 9 40 29	27	22	6 9 14 39	32	26	7 9 47 57	37	31
12	4 10 6 20	22	18	5 10 39 38	27	22	6 10 13 47	32	27	7 10 47 6	38	31
13	4 11 5 28	22	18	5 11 38 46	27	23	6 11 12 56	33	27	7 11 46 14	38	31
14	4 12 4 36	22	18	5 12 37 55	28	23	6 12 12 4	33	27	7 12 45 22	38	31
15	4 13 3 45	23	19	5 13 37 3	28	23	6 13 11 12	33	27	7 13 44 31	38	31
16	4 14 2 53	23	19	5 14 36 11	28	23	6 14 10 21	33	27	7 14 43 39	38	31
17	4 15 2 1	23	19	5 15 35 20	28	23	6 15 9 29	33	27	7 15 42 47	38	32
18	4 16 1 10	23	19	5 16 34 28	28	23	6 16 8 37	33	27	7 16 41 56	39	32
19	4 17 0 18	23	19	5 17 33 36	28	23	6 17 7 46	34	28	7 17 41 4	39	32
20	4 17 59 26	23	19	5 18 32 45	29	24	6 18 6 54	34	28	7 18 40 12	39	32
21	4 28 58 35	24	19	5 19 31 53	29	24	6 19 6 2	34	28	7 19 39 21	39	32
22	4 19 57 43	24	20	5 20 31 1	29	24	6 20 5 11	34	28	7 20 38 29	39	32
23	4 20 56 51	24	20	5 21 30 10	29	24	6 21 4 19	34	28	7 21 37 37	39	32
24	4 21 56 0	24	20	5 22 29 18	29	24	6 22 3 28	34	28	7 22 36 46	40	33
25	4 22 55 8	24	20	5 23 28 26	30	24	6 23 2 36	35	28	7 23 35 54	40	33
26	4 23 54 16	24	20	5 24 27 35	30	24	6 24 1 44	35	29	7 24 35 2	40	33
27	4 24 53 25	25	20	5 25 26 43	30	25	6 25 0 52	35	29	7 25 34 11	40	33
28	4 25 52 33	25	20	5 26 25 51	30	25	6 26 0 1	35	29	7 26 33 19	40	33
29	4 26 51 41	25	20	5 27 25 0	30	25	6 26 59 9	35	29	7 27 32 27	40	33
30	4 27 50 50	25	21	5 28 24 8	30	25	6 27 58 17	35	29	7 28 31 36	41	33
31	4 28 49 58	25	21				6 28 57 26	36	29	7 29 30 44	41	33

Mean

Mean MOTIONS of the SUN, and *fixed* STARS,

For MONTHS and DAYS.

Days.	SEPTEMBER.						OCTOBER.						NOVEMBER.						DECEMBER.					
	M. Mot. ☉				Ap.	✱s.	M. Mot. ☉.				Ap.	✱s.	M. Mot. ☉.				Ap.	✱s.	M. Mot. ☉.				Ap.	✱s
	s	°	′	″	″	″	s	°	′	″	″	″	s	°	′	″	″	″	s	°	′	″	″	
1	8	0	29	52	41	34	9	0	4	2	46	38	10	0	37	20	51	42	11	0	11	30	56	46
2	8	1	29	1	41	34	9	1	3	10	46	38	10	1	36	29	51	42	11	1	10	38	56	46
3	8	2	28	9	41	34	9	2	2	19	46	38	10	2	35	37	52	42	11	2	9	47	57	46
4	8	3	27	17	41	34	9	3	1	27	47	38	10	3	34	45	52	42	11	3	8	55	57	47
5	8	4	26	26	42	34	9	4	0	35	47	38	10	4	33	54	52	42	11	4	8	3	57	47
6	8	5	25	34	42	34	9	4	59	44	47	38	10	5	33	2	52	43	11	5	7	12	57	47
7	8	6	24	42	42	34	9	5	58	52	47	39	10	6	32	10	52	43	11	6	6	20	57	47
8	8	7	23	51	42	35	9	6	58	0	47	39	10	7	31	19	52	43	11	7	5	28	57	47
9	8	8	22	59	42	35	9	7	57	8	47	39	10	8	30	27	53	43	11	8	4	37	58	47
10	8	9	22	7	42	35	9	8	56	17	48	39	10	9	29	35	53	43	11	9	3	45	58	47
11	8	10	21	16	43	35	9	9	55	25	48	39	10	10	28	44	53	43	11	10	2	53	58	48
12	8	11	20	24	43	35	9	10	54	34	48	39	10	11	27	52	53	44	11	11	2	2	58	48
13	8	12	19	32	43	35	9	11	53	42	48	39	10	12	27	0	53	44	11	12	1	10	58	48
14	8	13	18	41	43	35	9	12	52	50	48	40	10	13	26	9	53	44	11	13	0	18	58	48
15	8	14	17	49	43	36	9	13	51	59	48	40	10	14	25	17	54	44	11	13	59	27	59	48
16	8	15	16	57	43	36	9	14	51	7	49	40	10	15	24	25	54	44	11	14	58	35	59	48
17	8	16	16	5	44	36	9	15	50	15	49	40	10	16	23	34	54	44	11	15	57	43	59	48
18	8	17	15	14	44	36	9	16	49	24	49	40	10	17	22	42	54	44	11	16	56	52	59	49
19	8	18	14	22	44	36	9	17	48	32	49	40	10	18	21	50	54	45	11	17	56	0	59	49
20	8	19	13	30	44	36	9	18	47	40	49	40	10	19	20	59	54	45	11	18	55	8	59	49
21	8	20	12	39	44	36	9	19	46	49	49	41	10	20	20	7	55	45	11	19	54	17	60	49
22	8	21	11	47	45	37	9	20	45	57	50	41	10	21	19	15	55	45	11	20	53	25	60	49
23	8	22	10	55	45	37	9	21	45	5	50	41	10	22	18	24	55	45	11	21	52	33	60	49
24	8	23	10	4	45	37	9	22	44	14	50	41	10	23	17	32	55	45	11	22	51	42	60	49
25	8	24	9	12	45	37	9	23	43	22	50	41	10	24	16	40	55	45	11	23	50	50	60	50
26	8	25	8	20	45	37	9	24	42	30	50	41	10	25	15	49	55	46	11	24	49	58	60	50
27	8	26	7	29	45	37	9	25	41	39	50	41	10	26	14	57	56	46	11	25	49	7	60	50
28	8	27	6	37	46	37	9	26	40	47	51	41	10	27	14	5	56	46	11	26	48	15	61	50
29	8	28	5	45	46	37	9	27	39	55	51	42	10	28	13	13	56	46	11	27	47	23	61	50
30	8	29	4	54	46	38	9	28	39	4	51	42	10	29	12	22	56	46	11	28	46	32	61	50
31							9	29	38	12	51	42							11	29	45	40	61	50

Mean MOTION of the SUN, and of the *fixed Stars* continued for Hours, Minutes, &c.

Hours	M.Mo. ☉	Hours	M.Mo. ☉
	° ′ ″		° ′ ″
Min. Seconds	′ ″ ‴ ″ ‴ iv	Min. Seconds	′ ″ ‴ ″ ‴ iv
1	0 2 28	31	1 16 23
2	0 4 56	32	1 18 51
3	0 7 24	33	1 21 19
4	0 9 51	34	1 23 47
5	0 12 19	35	1 26 14
6	0 14 47	36	1 28 42
7	0 17 15	37	1 31 10
8	0 19 43	38	1 33 38
9	0 22 11	39	1 36 6
10	0 24 38	40	1 38 34
11	0 27 6	41	1 41 1
12	0 29 34	42	1 43 29
13	0 32 2	43	1 45 57
14	0 34 30	44	1 48 25
15	0 36 58	45	1 50 53
16	0 39 26	46	1 53 21
17	0 41 53	47	1 55 48
18	0 44 21	48	1 58 16
19	0 46 49	49	2 0 44
20	0 49 17	50	2 3 12
21	0 51 45	51	2 5 40
22	0 54 13	52	2 8 8
23	0 56 40	53	2 10 36
24	0 59 8	54	2 13 3
25	1 1 36	55	2 15 31
26	1 4 4	56	2 17 59
27	1 6 32	57	2 20 27
28	1 9 0	58	2 22 55
29	1 11 27	59	2 25 23
30	1 13 55	60	2 27 50

SUN's DECLINATION from the EQUINOCTIAL, with the ECLIPTIC. According to the Mean Ecliptic Obliquity 23° 28′ ½. 1730.

Argument. SUN's true PLACE in the ECLIPTIC.

Sun's true Place	Aries } 0 Libra } 6 Sig.		Taurus } 1 Scorpio } 7 Sig.		Gemini } 2 Sagittarius } 8 Sig.		Sun's true Place.
	☉ Declin.	Diff.	☉ Declin.	Diff.	☉ Declin.	Diff.	
°	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	°
0	0 0 0	23 54	11 29 19	21 2	20 10 50	12 33	30
1	0 23 54	23 54	11 50 21	20 50	20 23 23	12 10	29
2	0 47 48	23 52	12 11 11	20 38	20 35 33	11 47	28
3	1 11 40	23 52	12 31 49	20 27	20 47 21	11 25	27
4	1 35 32	23 51	12 52 16	20 12	20 58 46	11 2	26
5	1 59 23	23 48	13 12 28	20 0	21 9 48	10 38	25
6	2 23 11	23 46	13 32 28	19 47	21 20 26	10 14	24
7	2 46 57	23 44	13 52 15	19 32	21 30 40	9 50	23
8	3 10 41	23 41	14 11 47	19 19	21 40 30	9 26	22
9	3 34 22	23 37	14 31 6	19 4	21 49 56	9 2	21
10	3 57 59	23 34	14 50 10	18 49	21 58 58	8 36	20
11	4 21 33	23 30	15 8 59	18 33	22 7 34	8 11	19
12	4 45 3	23 25	15 27 32	18 18	22 15 45	7 46	18
13	5 8 28	23 20	15 45 50	18 2	22 23 31	7 21	17
14	5 31 48	23 16	16 3 52	17 45	22 30 52	6 55	16
15	5 55 4	23 10	16 21 37	17 28	22 37 47	6 29	15
16	6 18 14	23 3	16 39 5	17 11	22 44 16	6 3	14
17	6 41 17	22 58	16 56 16	16 54	22 50 19	5 37	13
18	7 4 15	22 51	17 13 10	16 35	22 55 56	5 11	12
19	7 27 6	22 54	17 29 45	16 18	23 1 7	4 44	11
20	7 49 50	22 36	17 46 3	15 58	23 5 51	4 17	10
21	8 12 26	22 29	18 2 1	15 39	23 10 8	3 51	9
22	8 34 55	22 21	18 17 40	15 21	23 13 59	3 24	8
23	8 57 16	22 12	18 33 1	15 0	23 17 23	2 56	7
24	9 19 28	22 3	18 48 1	14 40	23 20 19	2 30	6
25	9 41 31	21 54	19 2 41	14 20	23 22 49	2 3	5
26	10 3 25	21 44	19 17 1	14 0	23 24 52	1 35	4
27	10 25 9	21 35	19 31 1	13 38	23 26 27	1 8	3
28	10 46 44	21 23	19 44 39	13 16	23 27 35	0 41	2
29	11 8 7	21 12	19 57 55	12 55	23 28 16	0 14	1
30	11 29 19		20 10 50		23 28 30		0
	☉ Declin.	Diff.	☉ Declin.	Diff.	☉ Declin.	Diff.	
Sun's Place.	Virgo } 5 Piſces } 11 Sig.		Leo } 4 Aquarius } 10 Sig.		Cancer } 3 Capricorn } 9 Sig.		Sun's Place.

☞ The Obliquity of the Ecliptic decreaſes about 50″ in a Century: therefore the Obliquity given in this Table, and in that Page 7 of the Lunar Tables, muſt be increaſed or decreaſed in that Ratio, according to the Number of Years the Year given is before or after the Radical Year 1730.

EQUATION of the SUN's CENTER, or of his Mean PLACE or ANOMALY to the True.

Argument. SUN's Mean Anomaly,

⊙'s An.	Sign 0.		Sig. 1.		Sig. 2.		Sig. 3.		Sig. 4.		Sig. 5.		⊙ An.
	—	Dif.	—	Dif.	—	Dif.	—	Dif.	—	Dif.	—	Dif.	
°	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	″ ′	°
0	0 0 0		0 56 52		1 39 15		1 55 49		1 41 22		0 59 0		30
1	0 1 59	1 59	0 58 36	1 44	1 40 16	1 1	1 55 50	0 1	1 40 22	1 0	0 57 12	1 48	29
2	0 3 58	1 59	1 0 18	1 42	1 41 15	0 59	1 55 49	0 1	1 39 20	1 2	0 55 23	1 49	28
3	0 5 57	1 59	1 1 59	1 41	1 42 13	0 58	1 55 46	0 3	1 38 16	1 4	0 53 34	1 49	27
4	0 7 56	1 59	1 3 39	1 40	1 43 8	0 55	1 55 42	0 4	1 37 10	1 6	0 51 44	1 50	26
5	0 9 54	1 58	1 5 18	1 39	1 44 2	0 54	1 55 35	0 7	1 36 3	1 7	0 49 53	1 51	25
6	0 11 52	1 58	1 6 57	1 39	1 44 54	0 52	1 55 26	0 9	1 34 53	1 10	0 48 1	1 52	24
7	0 13 50	1 58	1 8 33	1 36	1 45 44	0 50	1 55 15	0 11	1 33 41	1 12	0 46 8	1 53	23
8	0 15 48	1 58	1 10 9	1 36	1 46 33	0 49	1 55 1	0 14	1 32 28	1 13	0 44 14	1 54	22
9	0 17 45	1 57	1 11 43	1 34	1 47 19	0 46	1 54 45	0 16	1 31 13	1 15	0 42 19	1 55	21
10	0 19 42	1 57	1 13 16	1 33	1 48 3	0 44	1 54 29	0 16	1 29 57	1 16	0 40 23	1 56	20
11	0 21 39	1 57	1 14 48	1 32	1 48 45	0 42	1 54 9	0 20	1 28 38	1 19	0 38 27	1 56	19
12	0 23 36	1 57	1 16 19	1 31	1 49 25	0 40	1 53 47	0 22	1 27 19	1 19	0 36 31	1 56	18
13	0 25 32	1 56	1 17 47	1 28	1 50 4	0 39	1 53 23	0 24	1 25 57	1 22	0 34 33	1 58	17
14	0 27 28	1 56	1 19 16	1 29	1 50 41	0 37	1 52 57	0 26	1 24 34	1 23	0 32 34	1 59	16
15	0 29 23	1 55	1 20 42	1 26	1 51 15	0 34	1 52 29	0 28	1 23 9	1 25	0 30 35	1 59	15
16	0 31 17	1 54	1 22 7	1 25	1 51 48	0 33	1 51 58	0 31	1 21 42	1 27	0 28 36	1 59	14
17	0 33 11	1 54	1 23 30	1 23	1 52 19	0 31	1 51 26	0 32	1 20 14	1 28	0 26 36	2 0	13
18	0 35 5	1 54	1 24 52	1 22	1 52 47	0 28	1 50 52	0 34	1 18 45	1 29	0 24 35	2 1	12
19	0 36 58	1 53	1 26 13	1 21	1 53 14	0 27	1 50 16	0 36	1 17 13	1 32	0 22 34	2 1	11
20	0 38 51	1 53	1 27 33	1 20	1 53 38	0 24	1 49 38	0 38	1 15 41	1 32	0 20 32	2 2	10
21	0 40 43	1 52	1 28 50	1 17	1 54 1	0 23	1 48 56	0 42	1 14 7	1 34	0 18 29	2 3	9
22	0 42 34	1 51	1 30 6	1 16	1 54 21	0 20	1 48 13	0 43	1 12 31	1 36	0 16 26	2 3	8
23	0 44 24	1 51	1 31 20	1 14	1 54 39	0 18	1 47 29	0 44	1 10 55	1 36	0 14 23	2 3	7
24	0 46 13	1 49	1 32 33	1 12	1 54 55	0 16	1 46 43	0 46	1 9 16	1 39	0 12 20	2 3	6
25	0 48 2	1 49	1 33 44	1 11	1 55 9	0 14	1 45 55	0 48	1 7 37	1 39	0 10 17	2 3	5
26	0 49 50	1 48	1 34 54	1 10	1 55 21	0 12	1 45 4	0 51	1 5 56	1 41	0 8 14	2 3	4
27	0 51 37	1 47	1 36 2	1 8	1 55 31	0 10	1 44 11	0 53	1 4 14	1 42	0 6 11	2 3	3
28	0 53 23	1 46	1 37 8	1 6	1 55 39	0 8	1 43 16	0 55	1 2 31	1 44	0 4 8	2 3	2
29	0 55 8	1 45	1 38 13	1 5	1 55 45	0 6	1 42 20	0 56	1 0 46	1 45	0 2 4	2 4	1
30	0 56 52	1 44	1 39 15	1 2	1 55 49	0 4	1 41 22	0 58	0 59 0	1 46	0 0 0	2 4	0
	+	Dif.	+	Dif.	+	Dif.	+	Dif.	+	Dif.	+	Dif.	
⊙'s An.	Sig. 11.		Sig. 10.		Sig. 9.		Sig. 8.		Sig. 7.		Sig. 6.		⊙ An.

I. EQUATION of TIME; of Apparent to Mean and Mean to Apparent.

Argument. SUN's true place.

⊙ true Pla.	♈ ♎ 0 6 A. M. − +		Diff.	♉ ♏ 1 7 A. M. − +		Diff.	♊ ♐ 2 8 A. M. − +		Diff.	⊙ true Pla.
°	m	s	s	m	s	s	m	s	s	°
0	0	0	20	8	23	10	8	45	10	30
1	0	20	20	8	33	10	8	35	11	29
2	0	40	19	8	43	9	8	24	11	28
3	0	59	20	8	52	9	8	13	13	27
4	1	19	20	9	1	8	8	0	12	26
5	1	39	19	9	9	8	7	48	14	25
6	1	58	20	9	17	7	7	34	14	24
7	2	18	19	9	24	6	7	20	15	23
8	2	37	19	9	30	5	7	5	15	22
9	2	56	19	9	35	5	6	50	15	21
10	3	15	19	9	40	4	6	35	17	20
11	3	34	18	9	44	3	6	18	17	19
12	3	52	18	9	47	3	6	1	17	18
13	4	10	18	9	50	2	5	44	18	17
14	4	28	18	9	52	1	5	26	18	16
15	4	46	17	9	53	1	5	8	18	15
16	5	3	17	9	54	0	4	50	19	14
17	5	20	17	9	54	1	4	31	20	13
18	5	37	16	9	53	2	4	11	19	12
19	5	53	16	9	51	2	3	52	20	11
20	6	9	16	9	49	3	3	32	21	10
21	6	25	15	9	46	4	3	11	20	9
22	6	40	15	9	42	5	2	51	21	8
23	6	55	14	9	37	5	2	30	21	7
24	7	9	14	9	32	6	2	9	21	6
25	7	28	13	9	26	7	1	48	22	5
26	7	36	12	9	19	6	1	26	21	4
27	7	48	12	9	13	9	1	5	22	3
28	8	0	12	9	4	9	0	43	21	2
29	8	12	11	8	55	10	0	22	22	1
30	8	23		8	45		0	0		0
⊙ true Pla.	+ − A. M. 11 5 ♓ ♍		Diff.	+ − A. M. 10 4 ♒ ♌		Diff.	+ − A. M. 9 3 ♑ ♋		Diff.	⊙ true Pla.

II. EQUATION of TIME; of Apparent to Mean and Mean to Apparent.

Argument. SUN's Mean Anomaly.

⊙ M. An	Sig. 0 A. M. − +		Diff.	Sig. 1 A. M. − +		Diff.	Sig. 2 A. M. − +		Diff.	Sig. 3 A. M. − +		Diff.	Sig. 4 A. M. − +		Diff.	Sig. 5 A. M. − +		Diff.	⊙ M. An.
°	m	s	s	m	s	s	m	s	s	m	s	s	m	s	s	m	s	s	°
0	0	0	8	3	47	7	6	37	4	7	43	0	6	45	4	3	56	7	30
1	0	8	8	3	54	7	6	41	4	7	43	0	6	41	4	3	49	7	29
2	0	16	8	4	1	7	6	45	4	7	43	0	6	37	4	3	42	8	28
3	0	24	8	4	8	7	6	49	4	7	43	0	6	33	4	3	34	7	27
4	0	32	8	4	15	6	6	53	3	7	43	1	6	29	5	3	27	7	26
5	0	40	7	4	21	7	6	56	4	7	42	0	6	24	4	3	20	8	25
6	0	47	8	4	28	6	7	0	3	7	42	1	6	20	5	3	12	7	24
7	0	55	8	4	34	7	7	3	3	7	41	1	6	15	5	3	5	8	23
8	1	3	7	4	41	6	7	6	3	7	40	1	6	10	5	2	57	8	22
9	1	11	8	4	47	6	7	9	3	7	39	1	6	5	5	2	49	7	21
10	1	19	8	4	53	6	7	12	3	7	38	1	6	0	5	2	42	8	20
11	1	27	7	4	59	6	7	15	3	7	37	2	5	55	6	2	34	8	19
12	1	34	8	5	5	6	7	18	2	7	35	1	5	49	5	2	26	8	18
13	1	42	8	5	11	6	7	20	3	7	34	2	5	44	6	2	18	8	17
14	1	50	8	5	17	6	7	23	2	7	32	2	5	38	5	2	10	8	16
15	1	58	7	5	23	5	7	25	2	7	30	2	5	33	6	2	2	8	15
16	2	5	8	5	28	6	7	27	2	7	28	2	5	27	6	1	54	8	14
17	2	13	7	5	34	5	7	29	2	7	26	3	5	21	6	1	46	8	13
18	2	20	8	5	39	6	7	31	2	7	23	2	5	15	6	1	38	8	12
19	2	28	7	5	45	5	7	33	2	7	21	2	5	9	6	1	30	8	11
20	2	35	8	5	50	5	7	35	1	7	19	3	5	3	7	1	22	8	10
21	2	43	7	5	55	5	7	36	1	7	16	3	4	56	6	1	14	8	9
22	2	50	8	6	0	5	7	37	2	7	13	3	4	50	6	1	6	8	8
23	2	58	7	6	5	5	7	39	1	7	10	3	4	44	7	0	58	9	7
24	3	5	7	6	10	5	7	40	1	7	7	3	4	37	7	0	49	8	6
25	3	12	7	6	15	5	7	41	0	7	4	4	4	30	6	0	41	8	5
26	3	19	7	6	20	4	7	41	1	7	0	3	4	24	7	0	33	8	4
27	3	26	8	6	24	5	7	42	1	6	57	4	4	17	7	0	25	8	3
28	3	34	7	6	29	4	7	42	0	6	53	4	4	10	7	0	17	9	2
29	3	41	6	6	33	4	7	43	0	6	49	4	4	3	7	0	8	8	1
30	3	47		6	37		7	43		6	45		3	56		0	0		0
⊙ M. An.	+ − A. M. 11 Sig.		Diff.	+ − A. M. 10 Sig.		Diff.	+ − A. M. 9 Sig.		Diff.	+ − A. M. 8 Sig.		Diff.	+ − A. M 7 Sig.		Diff.	+ − A. M. 6 Sig.		Diff.	⊙ M. An.

The

The Equal Times of the Ecliptic Conjunction and Oppoſition obſerved in Eclipſes of the Sun and Moon, and reduced to the Meridian of GREENWICH: With the Difference of the Times computed from theſe Tables, with the Times obſerved.

Luminaries Eclipſed.	Years of our Lord	Month	Equal Time. Day	H.	′	″	Difference of Calculation in Time.	′	″
Sun	1715	April	21	21	28	19	—	0	10
Moon	1722	June	27	13	52	21	+	0	18
Sun	——	November	27	1	59	9	+	0	12
Moon	1729	February	2	8	58	56	+	0	2
Moon	——	July	28	13	6	36	—	0	38
Moon	1732	November	20	9	38	42	—	0	12
Moon	1736	September	8	14	50	25	—	0	8
Sun	1737	February	18	2	27	28	+	0	14
Moon	1740	January	2	10	33	41	+	0	46
Sun	1748	July	13	23	19	1	—	0	18
Sun	1764	March	31	22	26	11	+	0	16

The Times in the Solar Eclipſes are deduced from the moſt accurate Obſervations. Thoſe in the Lunar Eclipſes from the Catalogue of Obſervations in the COMMENT. GOTTINGENSES, Vol. 3d.

Radical Mean PLACES of the MOON from 1752 to 1852, New STYLE.

According to the accelerated Mean Motion, as corrected in the Royal Aſtronomer, Page 374.

Gregorian Style.		M. Place ☽.				M. Pl. Ap.				M. Pl. ☊			
		s	°	′	″	s	°	′	″	s	°	′	″
100	Yrs.	9	24	42	20	3	19	7	4	4	14	5	37
	1652	5	15	36	47	4	23	16	1	0	15	41	56
B.	1752	3	10	19	7	8	12	23	5	8	1	36	19
	1753	7	19	42	11	9	23	2	56	7	12	16	37
	1754	11	29	5	17	11	3	42	49	6	22	56	56
	1755	4	8	28	22	0	14	22	42	6	3	37	14
B.	1756	9	1	2	2	1	25	9	14	5	14	14	22
	1757	1	10	25	6	3	5	49	5	4	24	54	40
	1758	5	19	48	12	4	16	28	58	4	5	34	49
	1759	9	29	11	17	5	27	8	50	3	16	15	16
B.	1760	2	21	44	57	7	7	55	23	2	26	52	25
	1761	7	1	8	1	8	18	35	14	2	7	32	43
	1762	11	10	31	7	9	29	15	7	1	18	13	2
	1763	3	19	54	12	11	9	54	59	0	28	53	19
B.	1764	8	12	27	52	0	20	41	32	0	9	30	28
	1765	0	21	50	56	2	1	21	23	11	20	10	45
	1766	5	1	14	3	3	12	1	17	11	0	51	6
	1767	9	10	37	7	4	22	41	8	10	11	31	22
B.	1768	2	3	10	47	6	3	27	41	9	22	8	31
	1769	6	12	33	51	7	14	7	32	9	2	48	49
	1770	10	21	56	57	8	24	47	25	8	13	29	8
	1771	3	1	20	2	10	5	27	17	7	24	9	26
B.	1772	7	23	53	42	11	16	13	50	7	4	46	34
	1773	0	3	16	46	0	26	53	41	6	15	26	52
	1774	4	12	39	52	2	7	33	34	5	26	7	11
	1775	8	22	2	57	3	18	13	26	5	6	47	28
B.	1776	1	14	36	37	4	28	59	59	4	17	24	37
	1777	5	23	59	41	6	9	39	50	3	28	4	55
	1778	10	3	22	47	7	20	19	43	3	8	45	14
	1779	2	12	45	52	9	0	59	35	2	19	25	30
B.	1780	7	5	19	32	10	11	46	8	2	0	2	40
	1781	11	14	42	36	11	22	25	58	1	10	42	58
	1782	3	24	5	42	1	3	5	52	0	21	23	17
	1783	8	3	28	47	2	13	45	44	0	2	3	37
B.	1784	0	26	2	27	3	24	32	17	11	12	40	43
	1785	5	5	25	30	5	5	12	7	10	23	21	1
	1786	9	14	48	37	6	15	52	1	10	4	1	20
	1787	1	24	11	42	7	26	31	53	9	14	41	37
B.	1788	6	16	45	22	9	7	18	26	8	25	18	46
	1789	10	26	8	25	10	17	58	17	8	5	59	6
	1790	3	5	31	32	11	28	38	10	7	16	39	23
	1791	7	14	54	37	1	9	18	2	6	27	19	40
B.	1792	0	7	28	17	2	20	4	35	6	7	56	40
	1793	4	16	51	22	4	0	44	27	5	18	37	8
	1794	8	26	14	27	5	11	24	20	4	29	17	27
	1795	1	5	37	32	6	22	4	11	4	9	57	43
B.	1796	5	28	11	12	8	2	50	44	3	20	34	52
	1797	10	7	34	16	9	13	30	35	3	1	15	10
	1798	2	16	57	23	10	24	10	28	2	11	55	29
	1799	6	26	20	27	0	4	50	20	1	22	35	46

Gregorian Style.		M. Place ☽.				M. Pl. Ap.				M. Pl. ☊			
		s	°	′	″	s	°	′	″	s	°	′	″
100	Yrs.	9	24	42	20	3	19	7	4	4	14	5	37
	1652	5	15	36	47	4	23	16	1	0	15	41	56
	1800	11	5	43	30	1	15	30	10	1	3	16	3
	1801	3	15	6	34	2	26	10	1	0	13	56	21
	1802	7	24	29	40	4	6	49	54	11	24	36	41
	1803	0	3	52	45	5	17	29	46	11	5	16	57
B.	1804	4	26	26	25	6	28	16	19	10	15	54	6
	1805	9	5	49	29	8	8	56	10	9	26	34	24
	1806	1	15	12	35	9	19	35	3	9	7	14	43
	1807	5	24	35	40	11	0	15	55	8	17	55	0
B.	1808	10	17	9	20	0	11	2	28	7	28	32	9
	1809	2	26	32	24	1	21	42	19	7	9	12	27
	1810	7	5	55	30	3	2	22	12	6	19	52	46
	1811	11	15	18	35	4	13	2	4	6	0	33	3
B.	1812	4	7	52	15	5	23	48	37	5	11	10	12
	1813	8	17	15	19	7	4	28	28	4	21	50	30
	1814	0	26	38	25	8	15	8	21	4	2	30	49
	1815	5	6	1	30	9	25	48	13	3	13	11	6
B.	1816	9	28	35	50	11	6	34	46	2	23	48	15
	1817	2	7	58	13	0	17	14	37	2	4	28	33
	1818	6	17	21	20	1	27	54	30	1	15	8	52
	1819	10	26	44	25	3	8	34	22	0	25	49	9
B	1820	3	19	18	5	4	19	20	53	0	6	26	18
	1821	7	28	41	8	6	0	0	45	11	17	6	35
	1822	0	8	4	15	7	10	40	39	10	27	46	55
	1823	4	17	27	20	8	21	20	31	10	8	27	12
B.	1824	9	10	1	0	10	2	7	4	9	19	4	21
	1825	1	19	24	5	11	12	46	54	8	29	44	39
	1826	5	28	47	10	0	23	26	48	8	10	24	58
	1827	10	8	10	15	2	4	6	40	7	21	5	15
B.	1828	3	0	43	55	3	14	53	13	7	1	42	24
	1829	7	10	6	59	4	25	33	4	6	12	22	42
	1830	11	19	30	5	6	6	12	57	5	23	2	59
	1831	3	28	53	18	7	16	52	49	5	3	43	10
B.	1832	8	21	26	50	8	27	39	22	4	14	20	27
	1833	1	0	49	53	10	8	19	13	3	25	0	44
	1834	5	10	13	0	11	18	59	6	3	5	41	3
	1835	9	19	36	5	0	29	38	58	2	16	21	21
B.	1836	2	12	9	45	2	10	25	31	1	26	58	30
	1837	6	21	32	49	3	21	5	22	1	7	38	48
	1838	11	0	55	55	5	1	45	15	0	18	19	9
	1839	3	10	19	0	6	12	25	6	11	28	59	23
B.	1840	8	2	52	40	7	23	11	40	11	9	36	33
	1841	0	12	15	44	9	3	51	31	10	20	16	51
	1842	4	21	38	50	10	14	31	24	10	0	57	10
	1843	9	1	1	55	11	25	11	16	9	11	37	27
B.	1844	1	23	35	35	1	5	57	49	8	22	14	36
	1845	6	2	58	39	2	16	37	40	8	2	54	54
	1846	10	12	21	45	3	27	17	33	7	13	35	11
	1847	2	21	44	50	5	7	57	25	6	24	15	30
B.	1848	7	14	18	30	6	18	43	58	6	4	52	39
	1849	11	23	41	34	7	29	23	49	5	15	32	57
	1850	4	3	4	40	9	10	3	43	4	26	13	17
	1851	8	12	27	45	10	20	43	34	4	6	53	33
B.	1852	1	5	1	25	0	1	30	7	3	17	30	42

LUNAR TABLES.

Mean MOTIONS of the MOON,

For MONTHS and DAYS.

Days.	JANUARY.			FEBRUARY.			MARCH.		
	M. Mot. ☽.	Ap.	☊ ret	M. M ot. ☽.	Ap.	☊ et	M. Mot. ☽.	Ap.	☊ retr.
	s ° ′ ″	° ′ ″	° ′ ″	s ° ′ ″	° ′ ″	° ′ ″	s ° ′ ″	° ′ ″	° ′ ″
1	0 13 10 35	0 6 41	0 3 11	2 1 38 41	3 33 54	1 41 41	2 10 35 2	6 41 4	3 10 38
2	0 26 21 10	0 13 22	0 6 22	2 14 49 16	3 40 35	1 44 52	2 23 45 36	6 47 45	3 13 49
3	1 9 31 45	0 20 3	0 9 32	2 27 59 51	3 47 16	1 48 2	3 6 56 12	6 54 26	3 17 0
4	1 22 42 20	0 26 44	0 12 43	3 11 10 26	3 53 57	1 51 13	3 20 6 46	7 1 7	3 20 11
5	2 5 52 55	0 33 25	0 15 53	3 24 21 1	4 0 38	1 54 24	4 3 17 21	7 7 48	3 23 1
6	2 19 3 30	0 40 6	0 19 4	4 7 31 36	4 7 19	1 57 34	4 16 27 57	7 14 30	3 26 32
7	3 2 14 5	0 46 47	0 22 14	4 20 42 11	4 14 0	2 0 44	4 29 38 32	7 21 11	3 29 43
8	3 15 24 40	0 53 29	0 25 25	5 3 52 46	4 20 42	2 3 55	5 12 49 7	7 27 51	3 32 53
9	3 28 35 15	1 0 10	0 28 36	5 17 3 21	4 27 23	2 7 6	5 25 59 42	7 34 32	3 36 4
10	4 11 45 50	1 6 51	0 31 46	6 0 13 56	3 34 4	2 10 16	6 9 10 17	7 41 13	3 39 14
11	4 24 56 25	1 13 32	0 34 57	6 13 24 31	4 40 45	2 13 27	6 22 20 52	7 47 54	3 42 25
12	5 8 7 0	1 20 13	0 38 8	6 26 35 6	4 47 26	2 16 38	7 5 31 27	7 54 35	3 45 36
13	5 21 17 35	1 26 54	0 41 18	7 9 45 41	4 54 7	2 19 49	7 18 42 2	8 1 17	3 48 46
14	6 4 28 10	1 33 35	0 44 29	7 22 56 16	5 0 48	2 22 59	8 1 52 37	8 7 58	3 51 56
15	6 17 38 45	1 40 16	0 47 40	8 6 6 51	5 7 29	2 26 10	8 15 3 12	8 14 39	3 55 8
16	7 0 49 20	1 46 57	0 50 50	8 19 17 26	5 14 10	2 29 20	8 28 13 47	8 21 20	3 58 17
17	7 13 59 55	1 53 38	0 54 1	9 2 28 1	5 20 51	2 32 31	9 11 24 22	8 28 1	4 1 29
18	7 27 10 30	2 0 19	0 57 11	9 15 38 36	5 27 32	2 35 41	9 24 34 57	8 34 42	4 4 39
19	8 10 21 5	2 7 0	1 0 22	9 28 49 11	5 34 13	2 38 52	10 7 45 32	8 41 23	4 7 49
20	8 23 31 41	2 13 41	1 3 33	10 11 59 46	5 40 55	2 42 2	10 20 56 7	8 48 4	4 11 0
21	9 6 42 15	2 20 22	1 6 43	10 25 10 21	5 47 36	2 45 13	11 4 6 42	8 54 46	4 14 11
22	9 19 52 51	2 27 4	1 9 54	11 8 20 56	5 54 17	2 48 24	11 17 17 17	9 1 28	4 17 21
23	10 3 3 26	2 33 45	1 13 5	11 21 31 31	6 0 58	2 51 35	0 0 27 52	9 8 8	4 20 32
24	10 16 14 1	2 40 26	1 16 15	0 4 42 6	6 7 39	2 54 45	0 13 38 27	9 14 49	4 23 43
25	10 29 24 36	2 47 7	1 19 26	0 17 52 41	6 14 20	2 57 56	0 26 49 2	9 21 30	4 26 54
26	11 12 35 11	2 53 48	1 22 37	1 1 3 17	6 21 1	3 1 7	1 9 59 37	9 28 11	4 30 5
27	11 25 45 46	3 0 29	1 25 47	1 14 13 52	6 27 42	3 4 17	1 23 10 12	9 34 52	4 33 15
28	0 8 56 21	3 7 10	1 28 58	1 27 24 26	6 34 23	3 7 28	2 6 20 47	9 41 33	4 36 26
29	0 22 6 56	3 13 51	1 32 9	In Leap Year take out for a Day ſooner in *January* and *February*.			2 19 31 22	9 48 14	4 39 37
30	1 5 17 31	3 20 32	1 35 19				3 2 41 57	9 54 55	4 42 47
31	1 18 28 6	3 27 13	1 38 30				1 15 52 32	10 1 36	4 45 57

Mean MOTIONS of the MOON,

For MONTHS and DAYS.

Days.	APRIL.										MAY.										JUNE.									
	M. Mot. ☽.				Ap.			☊ retr.			M. Mot. ☽.				Ap.			☊ retr.			M. Mot. ☽.				Ap.			☊ retr.		
	s	°	′	″	°	′	″	°	′	″	s	°	′	″	°	′	″	°	′	″	s	°	′	″	°	′	″	°	′	″
1	3	29	3	7	10	8	17	4	49	8	5	4	20	37	13	28	49	6	24	27	6	22	48	43	16	56	3	8	2	58
2	4	12	13	42	10	14	58	4	52	18	5	17	31	12	13	35	30	6	27	38	7	5	59	18	17	2	44	8	6	8
3	4	25	24	17	10	21	39	4	55	30	6	0	41	48	13	42	12	6	30	49	7	19	9	53	17	9	24	8	9	19
4	5	8	34	52	10	28	21	4	58	40	6	13	52	23	13	48	52	6	34	0	8	2	20	28	17	16	5	8	12	29
5	5	21	45	28	10	35	1	5	1	50	6	27	2	58	13	55	33	6	37	10	8	15	31	3	17	22	46	8	15	40
6	6	4	56	3	10	41	42	5	5	1	7	10	13	33	14	2	15	6	40	20	8	28	41	38	17	29	27	8	18	51
7	6	18	6	38	10	48	24	5	8	12	7	23	24	8	14	8	56	6	43	31	9	11	52	13	17	36	9	8	22	1
8	7	1	17	13	10	55	5	5	11	22	8	6	34	43	14	15	37	6	46	42	9	25	2	49	17	42	50	8	25	12
9	7	14	27	47	11	1	46	5	14	33	8	19	45	18	14	22	18	6	49	52	10	8	13	24	17	49	31	8	28	23
10	7	27	38	23	11	8	27	5	17	44	9	2	55	53	14	28	59	6	53	3	10	21	23	59	17	56	12	8	31	33
11	8	10	48	58	11	15	8	5	20	54	9	16	6	28	14	35	40	6	56	14	11	4	34	34	18	2	53	8	34	44
12	8	23	59	32	11	21	49	5	24	6	9	29	17	3	14	42	21	6	59	25	11	17	45	9	18	9	34	8	37	55
13	9	7	10	8	11	28	30	5	27	16	10	12	27	38	14	49	2	7	2	35	0	0	55	44	18	16	15	8	41	5
14	9	20	20	43	11	35	11	5	30	27	10	25	38	13	14	55	43	7	5	46	0	14	6	19	18	22	56	8	44	16
15	10	3	31	17	11	41	52	5	33	37	11	8	48	48	15	2	24	7	8	56	0	27	16	54	18	29	38	8	47	27
16	10	16	41	52	11	48	33	5	36	48	11	21	59	23	15	9	5	7	12	7	1	10	27	29	18	36	18	8	50	37
17	10	29	52	28	11	55	14	5	39	59	0	5	9	58	15	15	46	7	15	18	1	23	38	4	18	42	59	8	53	48
18	11	13	3	2	12	1	55	5	43	9	0	18	20	33	15	22	28	7	18	28	2	6	48	39	18	49	41	8	56	58
19	11	26	13	38	12	8	36	5	46	20	1	1	31	8	15	29	9	7	21	39	2	19	59	14	18	56	21	9	0	9
20	0	9	24	13	12	15	17	5	49	31	1	14	41	43	15	35	50	7	24	50	3	3	9	49	19	3	2	9	3	20
21	0	22	34	47	12	21	59	5	52	41	1	27	52	18	15	42	31	7	28	0	3	16	20	25	19	9	44	9	6	30
22	1	5	45	23	12	28	40	5	55	53	2	11	2	54	15	49	12	7	31	11	3	29	31	0	19	16	25	9	9	41
23	1	18	55	57	12	35	21	5	59	3	2	24	13	28	15	55	53	7	34	22	4	12	41	35	19	23	6	9	12	51
24	2	2	6	33	12	42	2	6	2	14	3	7	24	3	16	2	34	7	37	32	4	25	52	9	19	29	47	9	16	2
25	2	15	17	8	12	48	43	6	5	24	3	20	34	38	16	9	15	7	40	43	5	9	2	44	19	36	28	9	19	13
26	2	28	27	43	12	55	24	6	8	35	4	3	45	13	16	15	50	7	43	54	5	22	13	19	19	43	9	9	22	23
27	3	11	38	17	13	2	5	6	11	45	4	16	55	48	16	22	37	7	47	4	6	5	23	54	19	49	50	9	25	34
28	3	24	48	52	13	8	46	6	14	56	5	0	6	23	16	29	18	7	50	15	6	18	34	29	19	56	31	9	28	4
29	4	7	59	28	13	15	27	6	18	6	5	13	16	58	16	35	59	7	53	25	7	1	45	4	20	3	12	9	31	5
30	4	21	10	3	13	22	8	6	21	17	5	26	27	33	16	42	40	7	56	36	7	14	55	39	20	9	54	9	35	6
31											6	0	38	8	16	49	22	7	59	46										

Mean

Mean MOTIONS of the MOON,

For MONTHS and DAYS.

Days.	JULY.									
	M. Mot. ☽.				Ap.			☊ retr.		
	s	°	′	″	°	′	″	°	′	″
1	7	28	6	14	20	16	34	9	38	17
2	8	11	16	49	20	23	15	9	41	27
3	8	24	27	24	20	29	56	9	44	38
4	9	7	37	59	20	36	37	9	47	49
5	9	20	48	34	20	43	18	9	50	59
6	10	3	59	9	20	49	59	9	54	10
7	10	17	9	44	20	56	41	9	57	20
8	11	0	20	19	21	3	22	10	0	31
9	11	13	30	54	21	10	3	10	3	42
10	11	26	41	30	21	16	44	10	6	52
11	0	9	52	5	21	23	25	10	10	3
12	0	23	2	40	21	30	6	10	13	14
13	1	6	13	15	21	36	47	10	16	24
14	1	19	23	50	21	43	29	10	19	35
15	2	2	34	25	21	50	9	10	22	46
16	2	15	45	0	21	56	50	10	25	56
17	2	28	55	35	22	3	31	10	29	7
18	3	12	6	10	22	10	13	10	32	17
19	3	25	16	45	22	16	53	10	35	28
20	4	8	27	20	22	23	35	10	38	39
21	4	21	37	55	22	30	16	10	41	49
22	5	4	48	30	22	36	57	10	45	0
23	5	17	59	5	22	43	38	10	48	11
24	6	1	9	40	22	50	19	10	51	21
25	6	14	20	15	22	57	0	10	54	32
26	6	27	30	50	23	3	41	10	57	42
27	7	10	41	25	23	10	22	11	0	53
28	7	23	52	0	23	17	4	11	4	4
29	8	7	2	35	23	23	44	11	7	14
30	8	20	13	10	23	30	26	11	10	25
31	9	3	23	45	23	37	7	11	13	35

Days.	AUGUST.									
	M. Mot. ☽.				Ap.			☊ retr.		
	s	°	′	″	°	′	″	°	′	″
1	9	16	34	20	23	43	48	11	16	47
2	9	29	44	55	23	50	29	11	19	57
3	10	12	55	30	23	57	10	11	23	8
4	10	26	6	5	24	3	50	11	26	18
5	11	9	16	40	24	10	31	11	29	29
6	11	22	27	15	24	17	12	11	32	40
7	0	5	37	50	24	23	53	11	35	50
8	0	18	48	25	24	30	35	11	39	1
9	1	1	59	0	24	37	16	11	42	12
10	1	15	9	35	24	43	57	11	45	22
11	1	28	20	10	24	50	38	11	48	33
12	2	11	30	45	24	57	19	11	51	44
13	2	24	41	20	25	4	0	11	54	54
14	3	7	51	55	25	10	41	11	58	5
15	3	21	2	30	25	17	22	12	1	16
16	4	4	13	5	25	24	3	12	4	36
17	4	17	23	40	25	30	44	12	7	37
18	5	0	34	15	25	37	25	12	10	47
19	5	13	44	0	25	44	6	12	13	58
20	5	26	55	25	25	50	47	12	17	9
21	6	10	6	0	25	57	29	12	20	19
22	6	23	16	35	26	4	10	12	23	30
23	7	6	27	10	26	10	51	12	26	40
24	7	19	37	45	26	17	32	12	29	51
25	8	2	48	20	26	24	13	12	33	2
26	8	15	58	55	26	30	54	12	36	13
27	8	29	9	30	26	37	35	12	39	23
28	9	12	20	5	26	44	16	12	42	34
29	9	25	30	40	26	50	57	12	45	43
30	10	8	41	15	26	57	38	12	48	55
31	10	21	51	51	27	4	20	12	52	5

Days.	SEPTEMBER.									
	M. Mot. ☽.				Ap.			☊ retr.		
	s	°	′	″	°	′	″	°	′	″
1	11	5	2	26	27	11	1	12	5	17
2	11	18	13	1	27	17	41	12	58	27
3	0	1	23	36	27	24	23	13	1	38
4	0	14	34	11	27	31	3	13	4	49
5	0	27	44	46	27	37	45	13	7	59
6	1	10	55	21	27	44	26	13	11	10
7	1	24	5	56	27	51	7	13	14	20
8	2	7	16	31	27	57	48	13	17	31
9	2	20	27	6	28	4	29	13	20	40
10	3	3	37	41	28	11	10	13	23	52
11	3	16	48	16	28	17	51	13	27	3
12	3	29	58	51	28	24	32	13	30	14
13	4	13	9	26	28	31	13	13	33	24
14	4	26	20	1	28	37	54	13	36	35
15	5	9	30	36	28	44	35	13	39	46
16	5	22	41	11	28	51	16	13	42	56
17	6	5	51	46	28	57	57	13	46	7
18	6	19	2	21	29	4	38	13	49	17
19	7	2	12	57	29	11	19	13	52	28
20	7	15	23	21	29	18	0	13	55	39
21	7	28	34	7	29	24	42	13	58	49
22	8	11	44	41	29	31	23	14	2	0
23	8	24	55	16	29	38	4	14	5	11
24	9	8	5	51	29	44	45	14	8	21
25	9	21	16	26	29	51	26	14	11	32
26	10	17	27	1	29	58	7	14	14	42
27	10	17	37	36	30	4	48	14	17	53
28	11	0	48	11	30	11	29	14	21	4
29	11	13	58	46	30	18	10	14	24	14
30	11	27	9	21	30	24	52	14	27	24

From Sept. 27, *the Mot.* ☽*'s Apog is expreſſed in Deg.* for Sig. and Deg

Mean

Mean MOTIONS of the MOON,

For Months and Days.

Days.	OCTOBER.										NOVEMBER.										DECEMBER.									
	M. Mot. ☽.				Ap.			☊ retr.			M. Mot. ☽.				Ap.			☊ retr.			M. Mot. ☽.				Ap.			☊ retr.		
	s	°	′	″	°	′	″	°	′	″	s	°	′	″	°	′	″	°	′	″	s	°	′	″	°	′	″	°	′	″
1	0	10	19	56	30	31	32	14	30	36	1	28	48	1	33	58	46	16	9	6	3	4	5	32	37	19	18	17	44	25
2	0	23	30	31	30	38	13	14	33	46	2	11	58	36	34	5	27	16	12	16	3	17	16	7	37	25	59	17	47	35
3	1	6	41	6	30	44	54	14	36	57	2	25	9	12	34	12	8	16	15	27	4	0	26	42	37	32	40	17	50	46
4	1	19	51	41	30	51	35	14	40	8	3	8	19	47	34	18	49	16	18	38	4	13	37	17	37	39	21	17	53	57
5	2	3	2	16	30	58	16	14	43	18	3	21	30	22	34	25	30	16	21	48	4	26	47	52	37	46	2	17	57	7
6	2	16	12	51	31	4	57	14	46	29	4	4	40	57	34	32	11	16	24	59	5	9	58	27	37	52	43	18	0	18
7	2	29	23	26	31	11	39	14	49	39	4	17	51	32	34	38	53	16	28	9	5	23	9	2	37	59	25	18	3	28
8	3	12	34	1	31	18	20	14	52	50	5	1	2	7	34	45	34	16	31	20	6	6	19	37	38	6	6	18	6	39
9	3	25	44	36	31	25	1	14	56	1	5	14	12	42	34	52	15	16	34	31	6	19	30	12	38	12	47	18	9	50
10	4	8	55	11	31	31	42	14	59	11	5	27	23	17	34	58	56	16	37	41	7	2	40	47	38	19	28	18	13	0
11	4	22	5	46	31	38	23	15	2	22	6	10	33	52	35	5	37	16	40	52	7	15	51	22	38	26	9	18	16	11
12	5	5	16	21	31	45	4	15	5	33	6	23	44	27	35	12	18	16	44	3	7	29	1	57	38	32	50	18	19	22
13	5	18	26	56	31	51	45	15	8	43	7	6	55	2	35	18	59	16	47	13	8	12	12	32	38	39	31	18	22	32
14	6	1	37	31	31	58	27	15	11	54	7	20	5	37	35	25	40	16	50	24	8	25	23	7	38	46	12	18	25	43
15	6	14	48	6	32	5	8	15	15	5	8	3	16	12	35	32	21	16	53	35	9	8	33	42	38	52	53	18	28	54
16	6	27	58	41	32	11	49	15	18	15	8	16	26	47	35	39	2	16	56	45	9	21	44	17	38	59	34	18	32	4
17	7	11	9	16	32	18	30	15	21	26	8	29	37	22	35	45	43	16	59	56	10	4	54	52	39	6	15	18	35	15
18	7	24	19	51	32	25	11	15	24	36	9	12	47	57	35	52	24	17	3	6	10	18	5	28	39	12	56	18	38	25
19	8	7	30	26	32	31	52	15	27	47	9	25	58	32	35	59	5	17	6	17	11	1	16	3	39	19	37	18	41	36
20	8	20	41	1	32	38	33	15	30	58	10	9	9	7	36	5	46	17	9	28	11	14	26	38	39	26	18	18	44	47
21	9	3	51	36	32	45	14	15	34	8	10	22	19	42	36	12	28	17	12	38	11	27	37	13	39	33	0	18	47	57
22	9	17	2	11	32	51	55	15	37	19	11	5	30	17	36	19	9	17	15	49	0	10	47	48	39	39	41	18	51	8
23	10	0	12	46	32	58	36	15	40	29	11	18	40	52	36	25	50	17	19	0	0	23	58	23	39	46	22	18	54	19
24	10	13	23	21	33	5	17	15	43	40	0	1	51	27	36	32	31	17	22	10	1	7	8	58	39	53	3	18	57	29
25	10	26	33	56	33	11	58	15	46	51	0	15	2	2	36	39	12	17	25	21	1	20	19	33	39	59	44	19	0	40
26	11	9	44	31	33	18	39	15	50	1	0	28	12	37	36	45	53	17	28	32	2	3	30	8	40	6	25	19	3	51
27	11	22	55	6	33	25	20	15	53	12	1	11	23	12	36	52	34	17	31	42	2	16	40	43	40	13	6	19	7	1
28	0	6	5	41	33	32	2	15	56	22	1	24	33	47	36	59	15	17	34	53	2	29	51	18	40	19	47	19	10	12
29	0	19	16	16	33	38	43	15	59	33	2	7	44	22	37	5	56	17	38	3	3	13	1	53	40	26	28	19	13	22
30	1	2	26	51	33	45	24	16	2	44	2	20	54	58	37	12	37	17	41	13	3	26	12	28	40	33	9	19	16	33
31	1	15	37	27	33	52	5	16	5	54											4	9	23	3	40	39	50	19	19	43

Motion of the Moon's Apogee, in this Page, for Signs and Degrees is expreſſed in Degrees.

Mean MOTION of the MOON continued,

For Hours, Minutes, &c.

	M. Motion ☽.			Apogee.		☊			M. Motion ☽.			Apogee.		☊	
Hours.	°	′	″	′	″	′	″	Hours.	°	′	‴	′	″	′	″
Min.	′	″	‴	″	‴	″	‴	Min.	′	″	‴	″	‴	″	‴
Sec.	″	‴	iv	‴	iv	‴	iv	Sec.	″	‴	iv	‴	iv	‴	iv
1	0	32	56	0	17	0	8	31	17	1	10	8	38	4	6
2	1	5	53	0	33	0	16	32	17	34	7	8	54	4	14
3	1	38	49	0	50	0	24	33	18	7	3	9	11	4	22
4	2	11	46	1	7	0	32	34	18	39	59	9	28	4	30
5	2	44	42	1	24	0	40	35	19	12	55	9	45	4	38
6	3	17	39	1	40	0	48	36	19	45	52	10	2	4	46
7	3	50	35	1	57	0	56	37	20	18	48	10	19	4	54
8	4	23	32	2	14	1	4	38	20	51	45	10	35	5	2
9	4	56	28	2	30	1	11	39	21	24	41	10	52	5	10
10	5	29	25	2	47	1	19	40	21	57	38	11	8	5	18
11	6	2	21	3	4	1	27	41	22	30	34	11	25	5	26
12	6	35	18	3	21	1	35	42	23	3	31	11	42	5	34
13	7	8	14	3	37	1	43	43	23	36	27	11	59	5	42
14	7	41	10	3	54	1	51	44	24	9	24	12	16	5	50
15	8	14	7	4	11	1	59	45	24	42	20	12	32	5	57
16	8	47	3	4	27	2	7	46	25	15	17	12	48	6	5
17	9	20	0	4	44	2	15	47	25	48	13	13	5	6	13
18	9	52	56	5	1	2	23	48	26	21	10	13	22	6	21
19	10	25	53	5	18	2	31	49	26	54	6	13	39	6	29
20	10	58	49	5	34	2	39	50	27	27	3	13	56	6	37
21	11	31	46	5	51	2	47	51	27	59	59	14	13	6	45
22	12	4	42	6	8	2	55	52	28	32	56	14	30	6	53
23	12	37	39	6	24	3	3	53	29	5	52	14	46	7	1
24	13	10	35	6	41	3	11	54	29	38	49	15	2	7	9
25	13	43	31	6	58	3	19	55	30	11	45	15	19	7	17
26	14	16	28	7	15	3	27	56	30	44	42	15	36	7	25
27	14	49	24	7	31	3	34	57	31	17	38	15	53	7	33
28	15	22	21	7	48	3	42	58	31	50	34	16	10	7	41
29	15	55	17	8	5	3	50	59	32	23	31	16	26	7	49
30	16	28	14	8	21	3	58	60	32	6	27	16	43	7	57

EQUATION of the Points of the Equinoctial, for the computed *Longitudes* of the Sun and Moon, from the Mean *Ecliptic* Obliquity, 23° 28′. 30″. as obſerved in the Year 1730. Alſo the Equat. of the *M.* to the *tr. Ecliptic* Obliquity. Together with the *Annual Preceſ.* of the Equ^{x}. from the Nutation of the Earth's *Axis,* during one Revol. of the ☽'s ☊, according to Dr. Bradley's Improvements of the *R. Obſerv.* at *Greenwich.*

Arg. Longitude of the Moon's Node, from the *Equinox.*

Long. ☽'s ☊		Equ. to Points of Eq^{x}.	Eq^{n}. to M.Oby of Ecl^{c}.	True Obliquity of the Ecliptic.			Eq^{n}. to M.Oby of Ecl^{c}.	Annual Prec. of Eq. Pt^{s}	Eq^{n}. to Points of Eq^{x}.	Long. ☽'s ☊	
s	°	″	″	°	′	″	″	″	″	s	°
0	0	—0,	+9,0	23	28	39,	+9,0	58,0	+0,	12	0
	5	—2,	+9,0			39,	+9,0	57,9	+2,		25
	10	—3,9	+8,9			38,9	+8,9	57,9	+3,9		20
	15	—5,8	+8,7			38,7	+8,7	57,7	+5,8		15
	20	—7,7	+8,5			38,5	+8,5	57,5	+7,7		10
	25	—9,6	+8,2			38,2	+8,2	57,3	+9,6		5
1	0	—11,3	+7,8	23	28	37,8	+7,8	57,0	+11,3	11	0
	5	—13,	+7,4			37,4	+7,4	56,6	+13,		25
	10	—14,5	+6,9			36,9	+6,9	56,2	+14,5		20
	15	—16,	+6,4			36,4	+6,4	55,7	+16,		15
	20	—17,3	+5,8			35,8	+5,8	55,2	+17,3		10
	25	—18,5	+5,2			35,2	+5,2	54,7	+18,5		5
2	0	—19,6	+4,5	23	28	34,5	+4,5	54,2	+19,6	10	0
	5	—20,5	+3,8			33,8	+3,8	53,6	+20,5		25
	10	—21,2	+3,1			33,1	+3,1	53,0	+21,2		20
	15	—21,8	+2,3			32,3	+2,3	52,3	+21,8		15
	20	—22,2	+1,6			31,6	+1,6	51,7	+22,2		10
	25	—22,5	+0,8			30,8	+0,8	51,0	+22,5		5
3	0	—22,6	+0,0	23	28	30,	+0,0	50,3	+22,6	9	0
	5	—22,5	—0,8			29,2	—0,8	49,7	+22,5		25
	10	—22,2	—1,6			28,4	—1,6	49,0	+22,2		20
	15	—21,8	—2,3			27,7	—2,3	48,4	+21,8		15
	20	—21,2	—3,1			26,9	—3,1	47,7	+21,2		10
	25	—20,5	—3,8			26,2	—3,8	47,1	+20,5		5
4	0	—19,6	—4,5	23	28	25,5	—4,5	46,5	+19,6	8	0
	5	—18,5	—5,2			24,8	—5,2	46,0	+18,5		25
	10	—17,3	—5,8			24,2	—5,8	45,5	+17,3		20
	15	—16,	—6,4			23,6	—6,4	45,0	+16,		15
	20	—14,5	—6,9			23,1	—6,9	44,5	+14,5		10
	25	—13,	—7,4			22,6	—7,4	44,1	+13.		5
5	0	—11,3	—7,8	23	28	22,2	—7,8	43,7	+11,3	7	0
	5	—9,6	—8,2			21,8	—8,2	43,4	+9,6		25
	10	—7,7	—8,5			21,5	—8,5	43,2	+7,7		20
	15	—5,8	—8,7			21,3	—8,7	43,0	+5,8		15
	20	—3,9	—8,9			21,1	—8,9	42,8	+3,9		10
	25	—2,	—9,			21,	—9,	42,8	+2,		5
6	0	—0,	—9.	23	28	21,	—9.	42,7	+0,	6	0
Long. ☽'s ☊		Eq^{n}. to Points of Eq^{x}.	Eq^{n}. to M.Obl. of Ecl^{c}.	True Obliquity of the Ecliptic.			Eq^{n} to M.Obl. of Ecl^{c}.	Annual Prec. of Eq.Pts.	Eq^{n}. to Points of Eq^{x}.	Long. ☽'s ☊	

I. Annual

I. Annual EQUATION of the MOON and APOGEE.

The EQUATION of the APOGEE to be doubled in SYZYGIES, and Half its Quantity taken for the EQUATION of the NODE at all Times.

Argument. SUN's MEAN ANOMALY.

Sun's Mean Anom.	SIGN o.				SIGN I.				SIGN II.				Sun's Mean Anom.
	☽ +	Dif.	Apog. −	Dif.	☽ +	Dif.	Apog. −	Dif.	☽ +	Dif	Apog. −	Dif.	
°	′ ″	″	′ ″	″	′ ″	″	′ ″	′ ″	′ ″	″	′ ″	″	°
0	0 00	12	0 00	22	5 33	10	10 38	20	9 44	6	18 34	12	30
1	0 12	12	0 22	23	5 43	10	10 58	19	9 50	6	18 46	10	29
2	0 24	11	0 45	22	5 53	10	11 17	19	9 56	6	18 56	9	28
3	0 35	11	1 7	23	6 3	11	11 36	19	10 2	5	19 7	10	27
4	0 47	11	1 29	22	6 13	10	11 55	18	10 7	6	19 17	10	26
5	0 58	12	1 51	22	6 23	10	12 13	18	10 13	5	19 27	9	25
6	1 10	11	2 23	22	6 33	10	12 31	19	10 18	5	19 36	10	24
7	1 21	12	2 35	22	6 43	9	12 50	17	10 23	5	19 46	9	23
8	1 33	11	2 57	22	6 52	9	13 7	18	10 28	5	19 55	9	22
9	1 44	11	3 19	22	7 1	9	13 25	17	10 33	5	20 4	8	21
10	1 55	12	3 41	22	7 10	9	13 42	17	10 38	4	20 12	9	20
11	2 7	11	4 3	22	7 19	9	13 59	17	10 42	4	20 21	7	19
12	2 18	12	4 25	21	7 28	9	14 16	17	10 46	4	20 28	8	18
13	2 30	11	4 46	21	7 37	9	14 33	17	10 50	4	20 36	6	17
14	2 41	11	5 7	22	7 45	9	14 50	16	10 54	3	20 42	6	16
15	2 52	11	5 29	22	7 54	9	15 6	16	10 57	3	20 48	7	15
16	3 3	11	5 51	21	8 3	8	15 22	15	11 0	3	20 55	6	14
17	3 14	11	6 12	21	8 11	8	15 37	16	11 3	3	21 1	5	13
18	3 25	11	6 33	22	8 19	8	15 53	15	11 6	2	21 6	4	12
19	3 36	11	6 55	21	8 27	8	16 8	15	11 8	2	20 10	5	11
20	3 47	11	7 16	21	8 35	8	16 23	14	11 11	2	20 15	3	10
21	3 58	11	7 37	21	8 43	7	16 37	15	11 13	2	21 18	4	9
22	4 9	11	7 58	20	8 50	8	16 52	14	11 15	2	21 22	4	8
23	4 20	11	8 18	20	8 58	7	17 6	14	11 17	2	21 26	4	7
24	4 31	11	8 38	20	9 5	7	17 20	13	11 19	2	21 30	4	6
25	4 42	10	8 58	20	9 12	7	17 33	13	11 21	1	21 34	2	5
26	4 52	10	9 18	18	9 19	6	17 46	12	11 22	1	21 36	2	4
27	5 2	11	9 36	18	9 25	7	17 58	12	11 23	1	21 38	1	3
28	5 13	10	9 58	20	9 32	6	18 10	12	11 24	1	21 39	1	2
29	5 23	10	10 18	20	9 38	6	18 22	12	11 25	0	21 40	0	1
30	5 33		10 38		9 44		18 34		11 25		21 40		0
Sun's Mean Anom.	− ☽	Dif.	+ Apog.	Dif.	− ☽	Dif.	+ Apog.	Dif.	− ☽	Dif.	+ Apog.	Dif.	Sun's Mean Anom.
	SIGN XI.				SIGN X.				SIGN IX.				

I. Annual EQUATION of the MOON and APOGEE.

The EQUATION of the APOGEE to be doubled in SYZYGIES, and Half its Quantity taken for the EQUATION of the NODE at all Times.

Argument. SUN's MEAN ANOMALY.

Sun's Mean Anom.	SIGN III.				SIGN IV.				SIGN V.				Sun's Mean Anom.
	☽ +	Dif.	Apog. −	Dif.	☽ +	Dif.	Apog. −	Dif.	☽ +	Dif.	Apog. −	Dif.	
°	′ ″	″	′ ″	″	′ ″	″	′ ″	″	′ ″	″	′ ″	″	°
0	11 25		21 40		10 2		18 57		5 52		11 1		30
1	11 25	0	21 40	0	9 56	6	18 46	11	5 41	11	10 41	20	29
2	11 25	0	21 39	1	9 50	6	18 34	11	5 30	11	10 21	20	28
3	11 24	1	21 39	0	9 43	7	18 22	12	5 19	11	10 0	21	27
4	11 24	0	21 38	1	9 37	6	18 10	12	5 8	11	9 39	21	26
5	11 23	1	21 37	2	9 30	7	17 57	13	4 51	11	9 19	20	25
6	11 23	0	21 35	2	9 23	7	17 44	13	4 46	11	8 59	20	24
7	11 22	1	21 32	3	9 16	7	17 31	13	4 35	11	8 38	21	23
8	11 21	1	21 30	2	9 9	7	17 17	14	4 24	11	8 17	21	22
9	11 20	1	21 27	3	9 2	7	17 3	14	4 12	12	7 56	21	21
10	11 18	2	21 24	3	8 55	7	16 49	14	4 0	12	7 34	22	20
11	11 16	2	21 21	3	8 47	8	16 34	15	3 49	11	7 12	22	19
12	11 14	2	21 17	4	8 39	8	16 19	15	3 37	12	6 50	22	18
13	11 12	2	21 13	4	8 31	8	16 4	15	3 26	11	6 28	22	17
14	11 10	2	21 8	5	8 23	8	15 49	15	3 14	12	6 6	22	16
15	11 7	3	21 3	5	8 15	8	15 33	16	3 2	11	5 43	23	15
16	11 4	3	20 58	5	8 7	8	15 17	16	2 51	11	5 21	22	14
17	11 1	3	20 52	6	7 58	9	15 1	16	2 39	12	4 59	22	13
18	10 57	4	20 46	6	7 49	9	14 44	17	2 26	13	4 37	22	12
19	10 54	3	20 38	8	7 40	9	14 26	18	2 14	12	4 14	23	11
20	10 50	4	20 31	7	7 31	9	14 9	17	2 2	12	3 51	23	10
21	10 46	4	20 23	8	7 22	9	13 51	18	1 50	12	3 28	23	9
22	10 41	5	20 15	8	7 13	9	13 33	18	1 38	12	3 5	23	8
23	10 37	4	20 7	8	7 4	9	13 15	18	1 26	12	2 42	23	7
24	10 33	4	19 58	9	6 54	10	12 57	18	1 14	12	2 19	23	6
25	10 28	5	19 48	10	6 44	10	12 39	18	1 1	13	1 56	23	5
26	10 23	5	19 39	9	6 33	11	12 20	19	0 49	12	1 33	23	4
27	10 18	5	19 29	10	6 23	10	12 0	20	0 37	12	1 10	23	3
28	10 13	5	19 19	10	6 12	11	11 41	19	0 25	12	0 47	23	2
29	10 8	5	19 8	9	6 2	10	11 21	20	0 13	12	0 23	23	1
30	10 2	6	18 57	11	5 52	10	11 1	20	0 0	13	0 0	24	0
Sun's Mean Anom.	− ☽	Dif.	+ Apog.	Dif.	− ☽	Dif.	+ Apog.	Dif.	− ☽	Dif.	+ Apog.	Dif.	Sun's Mean Anom.
	SIGN VIII.				SIGN VII.				SIGN VI.				

II. Equation of the Moon's Center in Syzigies,

Argument. Sun from the Moon's Apogee, once equated.

In the Oppoſition add ſix Signs to the *Argument.*

☉ à ☽'s Apogee	Sig. 0. —	Diff.	☽ 0 + 6 —	Sig. I. —	Diff.	☽ 0 + 6 —	Sig. II. —	Diff.	☽ 0 + 6 —	☉ à ☽'s Apogee
°	° ′ ″	′ ″	″	° ′ ″	′ ″	″	° ′ ″	′ ″	″	°
0	0 0 0		0	2 38 12		15	4 26 45		26	30
1	0 5 35		0	2 42 51	4 39	15	4 29 7	2 22	26	29
2	0 11 10	5 35	1	2 47 27	4 36	16	4 31 23	2 16	27	28
3	0 16 45	5 35	1	2 52 0	4 33	16	4 33 33	2 10	27	27
4	0 22 19	5 34	2	2 56 27	4 27	16	4 35 37	2 4	27	26
5	0 27 52	5 33	2	3 0 51	4 24	17	4 37 35	1 58	27	25
6	0 33 25	5 32	3	3 5 12	4 21	17	4 39 28	1 53	27	24
7	0 38 57	5 31	3	3 9 29	4 17	17	4 41 16	1 48	28	23
8	0 44 28	5 31	4	3 13 42	4 13	18	4 42 58	1 42	28	22
9	0 49 38	5 30	4	3 17 51	4 9	18	4 44 35	1 37	28	21
10	0 55 27	5 29	5	3 21 55	4 4	19	4 46 7	1 32	28	20
11	1 0 54	5 27	5	3 25 55	4 0	19	4 47 32	1 25	28	19
12	1 6 20	5 26	6	3 29 50	3 55	20	4 48 52	1 20	29	18
13	1 11 45	5 25	6	3 33 40	3 50	20	4 50 7	1 15	29	17
14	1 17 10	5 25	7	3 37 25	3 45	21	4 51 17	1 10	29	16
15	1 22 31	5 21	7	3 41 8	3 43	21	4 52 21	1 4	29	15
16	1 27 50	5 19	8	3 44 46	3 38	22	4 53 19	0 58	29	14
17	1 33 7	5 17	8	3 48 19	3 33	22	4 54 11	0 52	29	13
18	1 38 22	5 15	9	3 51 47	3 28	23	4 54 57	0 46	29	12
19	1 43 35	5 13	9	3 55 10	3 23	23	4 55 38	0 41	29	11
20	1 48 47	5 12	10	3 58 28	3 18	23	4 56 13	0 35	30	10
21	1 53 57	5 10	10	4 1 41	3 13	24	4 56 42	0 29	30	9
22	1 59 4	5 7	11	4 4 48	3 7	24	4 57 6	0 24	30	8
23	2 4 9	5 5	11	4 7 50	3 2	24	4 57 24	0 18	30	7
24	2 9 12	5 3	12	4 10 48	2 58	24	4 57 37	0 13	30	6
25	2 14 12	5 0	13	4 13 41	2 53	25	4 57 44	0 7	30	5
26	2 19 9	4 54	13	4 16 29	2 48	25	4 57 46	0 2	30	4
27	2 23 59	4 50	14	4 19 9	2 40	25	4 57 41	0 5	30	3
28	2 28 46	4 47	14	4 21 45	2 36	25	4 57 33	0 8	30	2
29	2 33 30	4 44	15	4 24 18	2 33	26	4 57 18	0 15	30	1
30	2 38 12	4 42		4 26 45	2 27	26	4 56 56	0 22	30	0
☉ à ☽'s Apogee	+ Sig. XI.	Diff.	☽ 0 + 6 —	+ Sig. X.	Diff.	☽ 0 + 6 —	+ Sig. IX.	Diff.	☽ 0 + 6 —	☉ à ☽'s Apogee

II. EQUATION of the MOON's Center in SYZIGIES,

Argument. Sun from the Moon's Apogee, once equated.

In the Oppoſition add ſix Signs to the *Argument.*

☉ à ☽ Apog.	Sig. III. —	Diff.	☽ o + 6 —	Sig. IV. —	Diff.	☽ o + 6 —	Sig. V. —	Diff.	☽ o + 6 —	☉ à ☽ Apog.
°	° ′ ″	′ ″	″	° ′ ″	′ ″	″	° ′ ″	′ ″	″	°
0	4 56 56		30	4 8 10		26	2 19 37		15	30
1	4 56 31	0 25	30	4 5 24	2 46	26	2 15 18	4 19	14	29
2	4 56 1	0 30	30	4 2 24	2 50	25	2 10 56	4 22	14	28
3	4 55 26	0 35	30	3 59 39	2 55	25	2 6 32	4 24	13	27
4	4 54 46	0 40	30	3 56 39	3 0	25	2 2 6	4 26	13	26
5	4 54 1	0 45	30	3 54 34	3 5	25	1 57 39	4 27	12	25
6	4 53 11	0 50	30	3 50 25	3 9	24	1 53 10	4 29	12	24
7	4 52 14	0 57	30	3 47 13	3 12	24	1 48 39	4 31	11	23
8	4 51 10	1 4	30	3 43 59	3 14	24	1 44 7	4 32	11	22
9	4 50 3	1 7	30	3 40 40	3 19	24	1 39 34	4 33	10	21
10	4 48 52	1 11	30	3 37 18	3 21	23	1 35 0	4 34	10	20
11	4 47 36	1 16	29	3 33 53	3 25	23	1 30 24	4 36	9	19
12	4 46 14	1 22	29	3 30 25	3 28	23	1 25 46	4 38	9	18
13	4 44 46	1 28	29	3 26 54	3 13	22	1 21 6	4 40	8	17
14	4 43 13	1 33	29	3 23 19	3 35	22	1 16 25	4 41	8	16
15	4 41 36	1 37	29	3 19 41	3 38	21	1 11 44	4 41	7	15
16	4 39 55	1 41	29	3 16 0	3 41	21	1 7 2	4 42	7	14
17	4 38 8	1 47	29	3 12 16	3 44	20	1 2 20	4 42	6	13
18	4 36 16	1 52	29	3 8 30	3 46	20	0 57 36	4 44	5	12
19	4 34 20	1 56	28	3 4 38	3 52	19	0 52 51	4 45	5	11
20	4 32 20	2 0	28	3 0 43	3 55	19	0 48 5	4 46	5	10
21	4 30 14	2 6	28	2 56 47	3 56	19	0 43 19	4 46	4	9
22	4 28 4	2 10	28	2 52 49	3 58	18	0 38 32	4 47	4	8
23	4 25 50	2 14	28	2 48 49	4 0	18	0 33 45	4 47	3	7
24	4 23 32	2 18	27	2 44 47	4 2	17	0 28 57	4 48	3	6
25	4 21 9	2 23	27	2 40 42	4 5	17	0 24 8	4 49	2	5
26	4 18 41	2 28	27	2 36 34	4 8	16	0 19 19	4 49	2	4
27	4 16 9	2 32	27	2 32 23	4 11	16	0 14 30	4 49	1	3
28	4 13 33	2 36	26	2 28 9	4 14	16	0 9 40	4 50	1	2
29	4 10 53	2 40	26	2 23 54	4 15	15	0 4 50	4 50	0	1
30	4 8 10	2 43	26	2 19 37	4 17	15	0 0 0	4 50	0	0
☉ à ☽ Apog.	+ Sig. VIII.	Diff.	☽ o + 6 —	+ Sig. VII.	Diff.	☽ o + 6 —	+ Sig. VI.	Diff.	☽ o + 6 —	☉ à ☽ Apog.

III. Equat. Moon.				IV. Eq. Moon.			
Arg. } 2☉ à ☽'s ☊ — ☉ à ☽'s Apog.				*Arg.* } Apogee ☽ — Apogee ☉			
Arg. proper.	S. 0 } + 6 } —	S. 1 } + 7 } —	S. 2 } + 8 } —	S. 0 } + 6 } —	S. 1 } + 7 } —	S. 2 } + 8 } —	Arg. prop.
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
0	0 0	0 30	0 52	0 0	1 12	2 5	30
1	0 1	0 31	0 52	0 2	1 15	2 7	29
2	0 2	0 32	0 53	0 5	1 17	2 8	28
3	0 3	0 32	0 53	0 7	1 19	2 9	27
4	0 4	0 33	0 54	0 10	1 21	2 10	26
5	0 5	0 34	0 54	0 12	1 23	2 11	25
6	0 6	0 35	0 55	0 15	1 25	2 12	24
7	0 7	0 36	0 55	0 17	1 27	2 13	23
8	0 8	0 36	0 56	0 20	1 29	2 14	22
9	0 9	0 37	0 56	0 22	1 31	2 15	21
10	0 10	0 38	0 56	0 25	1 33	2 16	20
11	0 11	0 39	0 57	0 27	1 35	2 17	19
12	0 12	0 39	0 57	0 30	1 37	2 17	18
13	0 13	0 40	0 57	0 32	1 39	2 18	17
14	0 14	0 41	0 58	0 35	1 41	2 19	16
15	0 15	0 42	0 58	0 37	1 43	2 20	15
16	0 16	0 42	0 58	0 40	1 44	2 20	14
17	0 17	0 43	0 58	0 42	1 46	2 21	13
18	0 18	0 44	0 59	0 44	1 48	2 21	12
19	0 19	0 45	0 59	0 46	1 49	2 22	11
20	0 20	0 46	0 59	0 49	1 51	2 22	10
21	0 21	0 47	0 59	0 51	1 52	2 23	9
22	0 22	0 47	0 59	0 54	1 54	2 23	8
23	0 23	0 48	1 0	0 56	1 55	2 24	7
24	0 24	0 48	1 0	0 59	1 57	2 24	6
25	0 25	0 49	1 0	1 1	1 58	2 24	5
26	0 26	0 49	1 0	1 3	2 0	2 24	4
27	0 27	0 50	1 0	1 5	2 1	2 25	3
28	0 28	0 51	1 0	1 8	2 3	2 25	2
29	0 29	0 51	1 0	1 10	2 4	2 25	1
30	0 30	0 52	1 0	1 12	2 5	2 25	0
Arg. proper.	S. 5 } + 11 } —	S. 4 } + 10 } —	S. 3 } + 9 } —	S 5 } + 11 } —	S. 4 } + 10 } —	S. 3 } + 9 } —	Arg. prop.

N. B. *Six Signs to be added to theſe Arg. in Oppoſition.*

Reduction of the Moon to the Ecliptic.

Argument. ☉ — ☽'s ☊. 1 Equated.

Arg. prop.	0.6 —	Diff.	1.7 —	Diff.	2.8 —	Diff.	Arg. prop.
°	′ ″	″	′ ″	″	′ ″	″	°
0	0 0		6 42		6 42		30
1	0 16	16	6 49	7	6 34	8	29
2	0 32	16	6 56	7	6 25	9	28
3	0 48	16	7 3	7	6 16	9	27
4	1 5	17	7 10	7	6 6	10	26
5	1 20	15	7 15	5	5 56	10	25
6	1 36	16	7 21	6	5 45	11	24
7	1 52	16	7 25	4	5 34	11	23
8	2 8	16	7 29	4	5 23	11	22
9	2 24	16	7 32	3	5 10	13	21
10	2 38	16	7 35	3	4 58	12	20
11	2 54	16	7 39	2	4 46	12	19
12	3 9	15	7 41	2	4 33	13	18
13	3 24	15	7 42	1	4 19	14	17
14	3 39	15	7 43	1	4 6	13	16
15	3 54	15	7 44	1	3 54	12	15
16	4 6	16	7 43	1	3 39	14	14
17	4 19	15	7 42	1	3 24	15	13
18	4 33	14	7 41	1	3 9	15	12
19	4 46	13	7 39	2	2 54	15	11
20	4 58	12	7 35	4	2 38	15	10
21	5 10	12	7 32	3	2 24	15	9
22	5 23	13	7 29	3	2 8	16	8
23	5 34	11	7 25	4	1 52	16	7
24	5 45	12	7 21	4	1 36	16	6
25	5 56	11	7 15	6	1 20	16	5
26	6 6	10	7 10	5	1 5	16	4
27	6 16	10	7 3	7	0 48	17	3
28	6 25	9	6 56	7	0 32	16	2
29	6 34	9	6 49	7	0 16	16	1
30	6 42	8	6 42	7	0 0	16	0
Arg. prop.	+ — 11 5	Diff.	+ — 10 4	Diff.	+ — 9 3	Diff.	Arg. prop.

The MOON's Latitude and Inclination to the ECLIPTIC in SYZIGIES.

1ſt. Argument. SUN à NODE.

2d. Argument, Complement SUN à NODE.—SUN's M. Anomaly.

☉ à ☽☊	Sig. 0 N. Sig. 6 S.	Diff.	2 Arg. 0. S. 6. N.	Sig. 1 N. Sig. 7 S.	Diff.	2. Arg. 1. S. 7. N.	Sig. 2 N. Sig. 8 S.	Diff.	2. Arg. 2. N. 8. S.	Inclinat. ☽'s Way	Diff.	☉ à ☽☊
°	° ′ ″	′ ″	″	° ′ ″	′ ″	″	° ′ ″	′ ″	″	° ′ ″	′ ″	°
0	0 0 0		0	2 30 12		14	4 19 31		24	5 17 20		30
1	0 5 15	5 15	0	2 34 42	4 36	14	4 22 13	2 34	24	5 17 17	0 3	29
2	0 10 30	5 15	1	2 39 9	4 27	14	4 24 42	2 29	24	5 17 8	0 9	28
3	0 15 44	5 14	1	2 43 34	4 23	15	4 27 6	2 24	24	5 16 54	0 14	27
4	0 20 59	5 15	2	2 47 56	4 22	15	4 29 25	2 19	25	5 16 33	0 21	26
5	0 26 13	5 14	2	2 52 15	4 19	15	4 31 40	2 15	25	5 16 6	0 27	25
6	0 31 26	5 13	3	2 56 30	4 15	16	4 33 49	2 9	25	5 15 33	0 33	24
7	0 36 39	5 13	3	3 0 42	4 12	16	4 35 53	2 4	25	5 14 55	0 38	23
8	0 41 51	5 12	4	3 4 51	4 9	16	4 37 52	1 59	26	5 14 11	0 44	22
9	0 47 2	5 11	4	3 8 56	4 5	17	4 39 47	1 55	26	5 13 22	0 49	21
10	0 52 13	5 11	5	3 12 58	4 2	17	4 41 37	1 50	26	5 12 27	0 55	20
11	0 57 23	5 10	5	3 16 56	3 58	18	4 43 21	1 44	26	5 11 26	1 1	19
12	1 2 31	5 8	6	3 20 51	3 55	18	4 45 0	1 39	26	5 10 19	1 7	18
13	1 7 38	5 7	6	3 24 42	3 51	18	4 46 34	1 34	26	5 9 6	1 13	17
14	1 12 44	5 6	7	3 28 29	3 47	19	4 48 3	1 29	27	5 7 47	1 19	16
15	1 17 49	5 5	7	3 32 12	3 43	19	4 49 26	1 23	27	5 6 22	1 25	15
16	1 22 52	5 3	8	3 35 51	3 39	19	4 50 44	1 18	27	5 4 52	1 30	14
17	1 27 54	5 2	8	3 39 26	3 35	20	4 51 57	1 13	27	5 3 16	1 36	13
18	1 32 54	5 0	9	3 42 57	3 31	20	4 53 4	1 7	27	5 1 35	1 41	12
19	1 37 52	4 58	9	3 46 24	3 27	20	4 54 6	1 2	27	4 59 49	1 46	11
20	1 42 49	4 57	10	3 49 48	3 24	21	4 55 3	0 57	27	4 57 56	1 53	10
21	1 47 44	4 55	10	3 53 7	3 19	21	4 55 55	0 52	27	4 55 58	1 58	9
22	1 52 37	4 53	11	3 56 22	3 15	21	4 56 42	0 47	27	4 53 55	2 3	8
23	1 57 27	4 50	11	3 59 33	3 11	22	4 57 23	0 41	28	4 51 47	2 8	7
24	2 2 15	4 48	12	4 2 39	3 6	22	4 57 58	0 35	28	4 49 43	2 14	6
25	2 7 0	4 45	12	4 5 40	3 1	22	4 58 27	0 29	28	4 47 14	2 19	5
26	2 11 43	4 43	13	4 8 36	2 56	22	4 58 51	0 24	28	4 44 50	2 24	4
27	2 16 24	4 41	13	4 11 28	2 52	23	4 59 10	0 19	28	4 42 20	2 30	3
28	2 21 2	4 38	13	4 14 16	2 48	23	4 59 24	0 14	28	4 39 45	2 35	2
29	2 25 38	4 36	13	4 17 0	2 44	23	4 59 32	0 8	28	4 37 5	2 40	1
30	2 30 12	4 34	14	4 19 39	2 39	24	4 59 35	0 3	28	4 34 17	2 46	0
☉ à ☽☊	Sig. 11 S. Sig. 5 N.	Diff.	2 Arg. 11. N. 5. S.	Sig. 10 S. Sig. 4 N.	Diff.	2 Arg. 10 N. 4 S.	Sig. 9 S. Sig. 3 N.	Diff.	2 Arg. 9. N. 3. S.	Inclinat. ☽'s Way	Diff.	☉ à ☽☊

THE true Hourly MOTIONS, DIAMETERS, and PARALLAXES of the SUN and MOON, in ECLIPSES.

N. B. In Eclipſes of the Moon, add 6 Signs to the Arg. Annuum, or ☉ à ☽ Ap. 1 equated.

Argument. Sun's M. Anomaly.																				
☉'sM. Anom.		☉'s h. Mo.		☉'s Diam.		☉'sM. Anom		Sun from Moon's Apogee		Moon's Hor. Motion		Moon's Horiz. Paral.		Moon's Horiz. Diam.		Sun from Moon's Apogee.		☽'s Alt.	In. of ☽'s Hor. Diam. Ap.	In. of ☽'s Hor. Diam. Per.
s	°	′	″	′	″	°	s	s	°	′	″	′	″	′	″	s	°	°	″	″
0	0	2	23	31	28	0	12	0	0	29	40	53	56	29	25	0	12	0	0	0
	5	2	23	31	28	25			5	29	41	53	57	29	25	25		2	1	1
	10	2	23	31	28	20			10	29	44	53	59	29	26	20		4	2	2
	15	2	23	31	29	15			15	29	48	54	3	29	28	15		6	3	4
	20	2	23	31	30	10			20	29	55	54	9	29	30	10		8	4	5
	25	2	23	31	31	5			25	30	2	54	16	29	34	5		10	5	6
1	0	2	24	31	32	0	11	1	0	30	11	54	25	29	40	0	11	12	6	7
	5	2	24	31	32	25			5	30	23	54	35	29	46	25		14	7	9
	10	2	24	31	34	20			10	30	34	54	46	29	51	20		16	8	11
	15	2	24	31	36	15			15	30	50	54	50	29	58	15		18	9	12
	20	2	25	31	38	10			20	31	4	55	3	30	5	10		20	10	13
	25	2	25	31	40	5			25	31	20	55	28	30	14	5		22	10	14
2	0	2	25	31	42	0	10	2	0	31	37	55	44	30	23	0	10	24	11	15
	5	2	26	31	45	25			5	31	59	56	1	30	32	25		26	12	16
	10	2	26	31	48	20			10	32	19	56	19	30	42	20		28	13	17
	15	2	26	31	51	15			15	32	41	56	38	30	52	15		30	14	18
	20	2	27	31	54	10			20	33	1	56	58	31	3	10		32	15	19
	25	2	27	31	57	5			25	33	23	57	17	31	14	5		34	16	20
3	0	2	28	32	0	0	9	3	0	33	45	57	37	31	25	0	9	36	16	21
	5	2	28	32	3	25			5	34	7	57	57	31	36	25		38	18	23
	10	2	28	32	5	20			10	34	31	58	18	31	47	20		41	19	24
	15	2	29	32	8	15			15	34	53	58	37	31	58	15		44	20	25
	20	2	29	32	11	10			20	35	13	58	56	32	9	10		48	21	27
	25	2	30	32	13	5			25	35	34	59	15	32	20	5		51	22	28
4	0	2	30	32	16	0	9	4	0	35	54	59	33	32	30	0	8	54	23	29
	5	2	31	32	19	25			5	36	14	59	51	32	39	25		57	23	30
	10	2	31	32	21	20			10	36	32	60	8	32	48	20		60	24	31
	15	2	31	32	23	15			15	36	48	60	23	32	57	15		63	25	32
	20	2	32	32	25	10			20	37	4	60	38	33	5	10		67	26	33
	25	2	32	32	27	5			25	37	15	60	51	33	12	5		69	26	34
5	0	2	32	32	29	0	7	5	0	37	30	61	2	33	18	0	7	72	27	34
	5	2	32	32	30	25			5	37	40	61	12	33	24	25		75	27	35
	10	2	33	32	31	20			10	37	48	61	20	33	28	20		78	27	35
	15	2	33	32	32	15			15	37	56	61	26	33	31	15		81	28	36
	20	2	33	32	32	10			20	38	2	61	31	33	34	10		84	28	36
	25	2	33	32	33	5			25	38	5	61	34	33	36	5		87	28	36
6	0	2	33	32	33	0	6	6	0	38	6	61	35	33	36	0	6	90	29	36

The *Angles* which the Way of the MOON makes with the *Ecliptic* in the *Eclipſes* of the SUN and MOON. H.

Moon à ☊	True Hourly MOTION of the MOON from the SUN.										Moon à ☊
Sig.0.6.	27′	28′	29′	30′	31′	32′	33′	34′	35′	36′	S.5.11.
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	°
0	84 14	84 15	84 16	84 17	84 18	84 18	84 19	84 20	84 20	84 21	30
3	84 14	84 15	84 16	84 17	84 18	84 18	84 19	84 20	84 20	84 21	27
6	84 16	84 17	84 18	84 19	84 20	84 20	84 21	84 22	84 23	84 23	24
9	84 19	84 20	84 21	84 21	84 22	84 23	84 24	84 24	84 25	84 26	21
12	84 22	84 23	84 24	84 25	84 26	84 27	84 27	84 28	84 29	84 29	18
15	84 27	84 28	84 29	84 30	84 30	84 31	84 32	84 33	84 33	84 34	15
17	84 31	84 31	84 32	84 33	84 34	84 35	84 35	84 36	84 37	84 37	13

The TIMES between the true Ecliptic *Conjunction* or *Oppoſition* of the Sun and Moon, and the *Middle of Eclipſe*, or greateſt Obſcuration, at the neareſt Diſt. of their Centers, Half of which Times, with the ſame Signs, will be nearly the Difference between the Orbit Syzygy and ſaid Middle of the Eclipſe.

☽ à ☊	True Hourly MOTION of the MOON from the SUN.										☽ à ☊
Sig.0.6	27′	28′	29′	30′	31′	32′	33′	34′	35′	36′	S.5.11.
0	—	—	—	—	—	—	—	—	—	—	0
0	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	30
1	1 14	1 11	1 8	1 6	1 4	1 2	1 0	0 58	0 56	0 54	29
2	2 28	2 22	2 17	2 12	2 7	2 3	1 59	1 55	1 52	1 48	28
3	3 41	3 33	3 25	3 17	3 10	3 4	2 58	2 52	2 47	2 42	27
4	4 54	4 43	4 32	4 23	4 13	4 5	3 57	3 49	3 42	3 36	26
5	6 7	6 53	5 40	5 28	5 16	5 5	4 55	4 46	4 38	4 29	25
6	7 19	7 2	6 46	6 32	6 18	6 5	5 54	5 43	5 32	5 22	24
7	8 30	8 10	7 52	7 36	7 20	7 5	6 52	6 39	6 26	6 15	23
8	9 41	9 18	8 58	8 39	8 21	8 4	7 49	7 34	7 20	7 7	22
9	10 51	10 26	10 3	9 41	9 22	9 3	8 45	8 28	8 13	7 58	21
10	12 0	11 32	11 7	10 43	10 21	10 1	9 41	9 23	9 5	8 49	20
11	13 8	12 38	12 10	11 44	11 20	10 57	10 36	10 16	9 57	9 39	19
12	14 16	13 43	13 13	12 44	12 18	11 53	11 30	11 8	10 48	10 28	18
13	15 22	14 46	14 14	13 43	13 15	12 48	12 23	11 59	11 38	11 16	17
14	16 26	15 48	15 13	14 40	14 10	13 42	13 15	12 50	12 27	12 4	16
15	17 29	16 49	16 11	15 37	15 4	14 34	14 6	13 39	13 14	12 50	15
16	18 30	17 48	17 9	16 32	15 58	15 26	14 56	14 27	14 1	13 35	14
17	19 30	18 46	18 5	17 26	16 50	16 16	15 44	15 15	14 47	14 20	13
	+	+	+	+	+	+	+	+	+	+	+

Hourly Increaſe and Decreaſe of the MOON's true Latitude in Eclipſes.

True Hourly MOTION of the MOON from the SUN.

Moon à ☊.	27′	28′	29′	30′	31′	32′	33′	34′	35′	36′	Moon à ☊.
	+	+	+	+	+	+	+	+	+	+	
Sig.0.6	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	S.5.11.
0	2 29	2 35	2 41	2 46	2 51	2 57	3 2	3 8	3 14	3 19	30
3	2 29	2 35	2 41	2 46	2 50	2 56	3 1	3 7	3 13	3 18	27
6	2 28	2 34	2 40	2 45	2 49	2 55	3 0	3 6	3 11	3 16	24
9	2 27	2 32	2 39	2 43	2 48	2 53	2 58	3 4	3 9	3 14	21
12	2 26	2 30	2 37	2 41	2 46	2 52	2 57	3 2	3 8	3 13	18
15	2 24	2 29	2 35	2 40	2 45	2 50	2 56	3 1	3 7	3 12	15
17	2 22	2 27	2 33	2 38	2 43	2 49	2 54	2 59	3 5	3 10	13
0	—	—	—	—	—	—	—	—	—	—	0

Mean MOTION of ☽ from ☉, &c. for Hours, Minutes, and Seconds.

H M S	M. ☽ à ☉ ° ′ ″	 ′ ″ ‴	 ″ ‴ iv	H M S	M. ☽ à ☉ ° ′ ″	 ′ ″ ‴	 ″ ‴ vi
1	0	30	29	31	15	44	47
2	1	0	57	32	16	15	16
3	1	31	26	33	16	45	44
4	2	1	54	34	17	16	13
5	2	32	23	35	17	46	41
6	3	2	52	36	18	17	10
7	3	33	20	37	18	49	39
8	4	3	49	38	19	18	7
9	4	34	17	39	19	48	36
10	5	4	46	40	20	19	4
11	5	35	15	41	20	49	33
12	6	5	43	42	21	20	2
13	6	36	12	43	21	50	30
14	7	6	41	44	22	20	59
15	7	39	9	45	22	51	28
16	8	7	38	46	23	21	56
17	8	38	6	47	23	52	25
18	9	8	35	48	24	22	53
19	9	39	4	49	24	53	22
20	10	9	32	50	25	23	51
21	10	40	1	51	25	14	19
22	11	10	29	52	26	24	48
23	11	40	58	53	26	55	16
24	12	11	27	54	27	25	45
25	12	41	55	55	27	56	14
26	13	12	24	56	28	26	42
27	13	42	53	57	28	57	11
28	14	13	21	58	29	27	40
29	14	43	50	59	29	58	8
30	15	14	18	60	30	28	37

ANGLE of the HOUR CIRCLE (paſſing through the SUN or MOON) with the ECLIPTIC. For finding the Parallactic Angle of the Sun or Moon, in ECLIPSES; and alſo in all Latitudes of the Moon.

Argument. Right Aſcenſion of the SUN, MOON, or STAR.

R. A. Sun or ☽	♈ 0 ♎ 6 Sig. 0 180 Deg.					1 7 Sig. 30 210 Deg.					2 8 Sig. 60 240 Deg					R. A. Sun or ☽
	∠H.Circ.			Diff.		∠H.Circ.			Diff.		∠H.Circ.			Diff.		
°	°	′	″	′	″	°	′	″	′	″	°	′	″	′	″	°
0	66	31	30			69	49	10			78	30	40			30
1	66	31	44	0	14	70	2	5	12	55	78	51	52	21	12	29
2	66	32	25	0	41	70	15	22	13	17	79	13	17	21	25	28
3	66	33	33	1	8	70	28	59	13	37	79	34	51	21	34	27
4	66	35	8	1	35	70	42	59	14	0	79	56	35	21	44	26
5	66	37	11	2	3	70	57	19	14	20	80	18	29	21	54	25
6	66	39	41	2	30	71	11	59	14	40	80	40	32	22	3	24
7	66	42	37	2	56	71	26	59	15	0	81	2	44	22	12	23
8	66	46	1	3	24	71	42	19	15	20	81	25	4	22	20	22
9	66	49	52	3	51	71	57	59	15	40	81	47	33	22	29	21
10	66	54	9	4	17	72	13	58	15	59	82	10	10	22	37	20
11	66	58	53	4	44	72	30	15	16	17	82	32	54	22	44	19
12	67	4	3	5	10	72	46	50	16	35	82	55	45	22	51	18
13	67	9	40	5	37	73	3	44	16	54	83	18	43	22	58	17
14	67	15	44	6	4	73	20	58	17	14	83	41	46	23	3	16
15	67	22	13	6	29	73	38	23	17	25	84	4	56	23	10	15
16	67	29	8	6	55	73	56	8	17	45	84	28	11	23	15	14
17	67	36	29	7	21	74	14	10	18	2	84	51	32	23	21	13
18	67	44	15	7	46	74	32	28	18	18	85	14	57	23	25	12
19	67	52	26	8	11	74	51	2	18	34	85	38	27	23	30	11
20	68	1	2	8	36	75	9	50	18	48	86	2	1	23	34	10
21	68	10	4	9	2	75	28	56	19	6	86	25	38	23	37	9
22	68	19	30	9	26	75	48	13	19	17	86	49	19	23	41	8
23	68	29	20	9	50	76	7	45	19	32	87	13	3	23	44	7
24	68	39	34	10	14	76	27	32	19	47	87	36	49	23	46	6
25	68	50	12	10	38	76	47	32	20	0	88	0	38	23	49	5
26	69	1	14	11	2	77	7	45	20	12	88	24	28	23	50	4
27	69	12	39	11	25	77	28	11	20	26	88	48	19	23	51	3
28	69	24	26	11	47	77	48	49	20	38	89	12	13	23	54	2
29	69	36	37	12	11	78	9	39	20	50	89	36	6	23	53	1
30	69	49	10	12	33	78	30	40	21	1	90	0	0	23	54	0
R. A. Sun or ☽	∠H.Circ.			Diff.		∠H.Circ.			Diff.		∠H.Circ.			Diff.		R. A. Sun or ☽
	5 11 Sig. 150 330 Deg.					4 10 Sig. 120 300 Deg.					♋ 3 ♑ 9 Sig. 90 270 Deg.					

PRECEPTS
FOR
Computing the Times of the NEW and FULL MOON or ECLIPTIC CONJUNCTION and OPPOSITION from theſe Tables.

1. HAVING found the Day of the Moon's Change by the Epact for the Month required of any given Year, collect the Radical Places and Mean Motions of the Sun, Moon, their Apogees and Node for that Year, Month and Day into different Sums. As the Motion of the Node is retrograde, a Line muſt be drawn under its Radical Place, and the mean Motion of the Month, Day, Hour, &c. be collected into one Sum, and deducted from the Radical Place to give the Place to the time ſought. The Radical Places of the Sun and Moon, their Apogees and her Node, for any *Intermediate* Year between 1652 and 1752 are thus obtained.

For any Year of the 17th Century; deduct a Century's Motion of the Sun and Moon and of their Apogees from the Correſpondent Year in the 18th Century, and it gives the Radical Places for the Years required New Stile: but to gain the Radical Place of the Node for any Years backward a Centuries Motion muſt be added. To adapt theſe Radical Places to the Old Stile for the 17th Century 10 Day's M. Motion of the Sun, Moon and Apogees muſt be added to theſe already found, and as many Day's Motion ſubtracted from the Place of the Node: and for the 18th Century the Motion of 11 Days to be added and ſubtracted in like manner.

The Radical Places for any given Year between 1699 and 1752 is had, by deducting the Motions of a Century from the correſpondent Year in the 19th Century and adding the Motions of 11 Days to the Radical Places ſo found: but the Motion of the Node is always to be added where that of the Moon and Apogee is ſubtracted, as the Nature of the Thing ſhews.

2. Subtract the Apogee of the Sun from the M. Longitude: the Remainder is the M. Anomaly. With this enter the Table of its Central Equation, take it out and apply it according to its Title, or Index + or — and you have the equated Longitude of the Sun.

3. With the Sun's Anomaly take out the Annual Equations of the Moon and Apogeon; the Equation of the Apogeon muſt be doubled, and add or ſubtract theſe according to their Titles and you have their Longitudes once equated. For the Annual Equation of the Node take half the Equation of the Apogeon, and add or ſubtract it according as the Ann. Equation of the Moon, and you have its M. Longitude correct.

4. From the equated Place of the Sun ſubtract the equated Place of the Moon's Apogee: the Remainder, called the ARGUMENTUM ANNUUM, is the Argument of the Central Equation. With this enter the Table of that Equation, and take it out according to its Title, adding or ſubtracting the Correction in the Column marked ☽ from it, as the Moon is in Conjunction or Oppoſition, and the Sum or Difference is the Central Equation correct. This Equation added or ſubtracted from the M. Place of the Moon once equated, gives the equated Longitude of the Moon in her Orbit.

5. If the equated Longitude of the Moon thus found is the ſame with that of th Sun; the Time given is *nearly* the time of Orbit Conjunction; or if *ſix* Signs from it o Orbit Oppoſition. But as it commonly differs, ſubtract the Place of the Sun from tha of the Moon, and mark the difference. With this difference enter the Table o the Mean Motion of the Moon from the Sun, and take out the Hours, Minutes an Seconds, correſpondent to that difference; which add or ſubtract from the preſent Time, as the Moon is ſhort of or paſt Conjunction or Oppoſition, and you wil have a much nearer Time given.

This Operation muſt be repeated till the Sun and Moon's Place nearly coincide. Commonly two Operations will do.

6. Having obtained the true time of the Orbit Conjunction or Oppoſition *very nearl* by this Method; recompute the Places of the Sun and Moon as before. Then in orde to obtain the Ecliptic Conjunction or Oppoſition with great Preciſion.

7. From the Sun's Place ſubtract the equated Place of the Node: the remainde is the Argument of Latitude to the Time given. *Double* this, and ſubtract from i the Argumentum Annuum; the reſidue is the Argument of the third Equation.

8. From the Apogee of the Moon ſubtract the Sun's Apogee, the Remainder is th Argument of the 4th Equation. In the Oppoſition ſix Signs muſt be added to it.

[The Tables will direct that in the Oppoſition ſix Signs muſt be added to all th Arguments of Equation, but that of the Annual Equation depending on th Sun's Anomaly. Or which is the ſame, in taking out the Arguments add ſi Signs to the Sun's Place.]

9. With the Arguments of theſe Equations take them out from their reſpective Tables, as their Titles direct: The Sum or Difference of them added or ſubtracted gives her Longitude four Times equated, or Orbit Longitude very nearly.

10. With the Argument of Latitude take out the Reduction; which add or ſubtract as it directs, and you have the Ecliptic Longitude of the Moon correct for th Time given.

11. From the Ecliptic Longitude of the Moon thus found, deduct once more th Longitude of the Sun: the difference, if any, being turned into Time by the Tabl of the Hourly Motion of the Moon from the Sun, gives the Times of the Conjunction or Oppoſition *correctly*.

12. With the Argument of Latitude enter the Table of Latitude, and take it ou according to its Title.

13. From the Complement of this Argument deduct the Sun's Anomaly, and th remainder ſhall be the Argument of Equation ſubjoyning. If both this Equation an the Latitude are of the ſame Denomination, that is both South or North: the the Sum of them is the correct Latitude: but if they are of different Denominations, one South the other North: then the Difference is the correct Latitude.

14. For the Sun's Hourly Motion and Horizontal Diameter enter the Table with the Sun's Mean Anomaly.

15. For the Moon's Hourly Motion, Horizontal Diameter, and Parallax, you muſt make uſe of the Argumentum Annuum or Diſtance of the Sun from the equated Apogee of the Moon; adding ſix Signs in Oppoſition.

To exemplify this conciſe Method of Computation, I ſhall take the obſerved time of the true Ecliptic Conjunction in the great Annular Eclipſe *April* 1ſt. 1764. The obſerved times being deduced from the Obſervations made at *London* and *Oxford*, and reduced to the Meridian of *Greenwich*.

EXAMPLE

EXAMPLE I.

For Computing the SUN and MOON's Place in SYZIGIES, April 1, 1764.

The SUN's PLACE for the obſerved Time of the Ecliptic Conjunction.

Eq. Time	Sun's Longitude s	°	'	"	Sun's Apogee. s	°	'	"
1764	9	10	36	41	3	8	49	23
Mar. 31.	2	28	42	30				15
H. 22.		0	54	13	3	8	49	38
26' 11"			1	4	0	11	14	48
M. Longitude.	0	10	14	28	9	1	25	10
Centr. Equat.	+	1	55	42	Sun's Hor. Mot.			
							2'	28"
Sun's Equated Longitude.	♈	12	10	10	⊙'s Dia.		31	59

By comparing the ſeveral Obſervations, the Ecliptic Conjunction at *Greenwich* was

	h	'	"	
March 31	22	22	23	App. Time.
Equation of Time	+	3	48	
Mean Time of Conjunction	h	'	"	
	22	26	11	
or April 1	10	26	11	

The MOON's PLACE for the ſame Time.

Equ. Time.	☽'s Longitude. s	°	'	"	☽'s Apogee. s	°	'	"	☽'s Node. s	°	'	"
1764												
March 31	8	12	27	52	0	20	41	32	0	9	30	28
Hour 22	3	15	52	32		10	1	36		4	45	57
26' 11"		12	4	42			6	8			2	55
			14	22				7	—	4	48	52
M. Long. ☽.	0	10	39	28	1	00	49	23	0	4	41	36
An. Equations.		—	11	25		+	43	19		—	10	50
☽. 1. Equat.	0	10	28	3	1	1	32	42	0	4	30	46
Central Equa.	+	1	45	40	0	12	10	30	0	12	10	10
☽. 2. Equat.	0	12	13	43	11	10	37	48	,0	7	39	24
2. Equations.		—	1	39	Argum. Annuum.				Arg. of Latitude.			
☽. Eclipt.	0	12	12	4	M.C.Eq.	1	45	30	Lat.N.	0	40'	6"
Reduction.		—	2	2	Corr.		+	10	Eq.S.	—	0	27
☽.4.Eq. Long.	♈	12	10	2	C.Eq.co.	1	45	40	Lat.N.	0	39	39
⊙ Longitude.		12	10	10	H.Mo. ☽		29'	52"	H.Mo. ☽		29'	52
Differ. Long.		—	0	8	Hor.Par.		54	7	H.inc. Redn.		—	7
In Time		+	0	16	Hor.Dia.		29	30				
Ecl. ☌ Comp.	March				☽ à ⊙		27'	24"				
	31	22	26	27					H.M. ☽ in Ecl.		29	45
									☽ à ⊙ in Ec.		27	17

Arguments of Equations.

	s	°	'	
⊙ à ☊	0	7	40	
2.	0	15	20	
⊙ à Apog.	11	10	38	Equat.
Arg. III. Eq	1	4	42	Eq. + 0' 35"
☽ Apog.	1	1	33	
⊙ Apog.	3	8	50	
Arg. IV. Eq.	9	22	43	Eq. — 2' 13"
				Diff. — 1 39

⊙ Longitude	s	°	'	
Comp.	11	22	20	
⊙ Anom.	9	1	25	
Arg. Eq. of Lat.	2	20	55	Equat. 0' 27" — S

LUNAR EQUATIONS *extra Syzigia.*

I. For the *Annual Equation*, ſee *Page* 8, entitled *Annual Equation* of *Moon* and *Apogee*.

II. EQUATION of the MOON, or I. *Semiannual.*

Argument. Mean Longitude Sun from M. Place of the Moon's Apogee.

⊙ à ☽'s Apogee	Sig. 0.		Sig. 1.		Sig. 2.		Sig. 3.		Sig. 4.		Sig. 5.		⊙ à ☽'s Apogee
	−	D.	−	D.	−	D.	∓	D.	+	D.	+	D.	
°	′ ″	″	′ ″	″	′ ″	″	′ ″	″	′ ″	″	′ ″	″	°
0	0 0		5 4		5 17		0 30		4 27		4 39		30
1	0 13	13	5 11	7	5 11	6	0 18	12	4 33	6	4 33	6	29
2	0 26	13	5 17	6	5 5	6	0 6	12	4 38	5	4 27	6	28
3	0 39	13	5 23	6	4 58	7	− 0 6	12	4 43	5	4 21	6	27
4	0 52	13	5 30	7	4 51	7	0 18	12	4 47	4	4 15	6	26
5	1 4	12	5 35	5	4 44	7	0 30	12	4 52	5	4 8	7	25
6	1 16	12	5 39	4	4 37	7	0 41	11	4 56	4	4 1	7	24
7	1 28	12	5 43	4	4 29	8	0 52	11	5 0	4	3 54	7	23
8	1 40	12	5 47	4	4 21	8	1 3	11	5 4	4	3 46	8	22
9	1 51	11	5 50	3	4 13	8	1 14	11	5 7	3	3 38	8	21
10	2 3	12	5 53	3	4 4	9	1 25	11	5 10	3	3 30	8	20
11	2 14	11	5 55	2	3 55	9	1 36	11	5 12	2	3 21	9	19
12	2 25	11	5 57	2	3 46	9	1 47	11	5 14	2	3 12	9	18
13	2 36	11	5 58	1	3 37	9	1 59	12	5 15	1	3 2	10	17
14	2 47	11	5 59	1	3 27	10	2 10	11	5 16	1	2 52	10	16
15	2 57	10	5 59	0	3 17	10	2 20	10	5 16	0	2 42	10	15
16	3 7	10	5 59	0	3 7	10	2 30	10	5 16	0	2 32	10	14
17	3 17	10	5 58	1	2 57	10	2 40	10	5 15	1	2 22	10	13
18	3 27	10	5 58	0	2 46	11	2 50	10	5 15	0	2 12	10	12
19	3 36	9	5 57	1	2 35	11	2 59	9	5 14	1	2 2	10	11
20	3 45	9	5 56	1	2 24	11	3 9	10	5 13	1	1 51	11	10
21	3 54	9	5 54	2	2 13	11	3 18	9	5 12	1	1 40	11	9
22	4 3	9	5 51	3	2 2	11	3 27	9	5 10	2	1 30	10	8
23	4 12	9	5 49	2	1 51	11	3 36	9	5 7	3	1 19	11	7
24	4 20	8	5 46	3	1 40	11	3 48	8	5 4	3	1 8	11	6
25	4 28	8	5 42	4	1 29	11	3 56	8	5 0	4	0 57	11	5
26	4 36	8	5 38	4	1 18	11	4 3	7	4 56	4	0 46	11	4
27	4 43	7	5 33	5	1 6	12	4 10	7	4 52	4	0 35	11	3
28	4 50	7	5 28	5	0 54	12	4 16	6	4 48	4	0 24	11	2
29	4 57	7	5 23	5	0 42	32	4 22	6	4 44	4	0 12	12	1
30	5 4	7	5 17	6	0 30	12	4 27	5	4 39	5	0 0	12	0
	+	D.	+	D.	+	D.	±	D.	−	D.	−	D.	
⊙ à ☽'s Apogee	Sig. 11.		Sig. 10.		Sig. 9.		Sig. 8.		Sig. 7.		Sig. 6.		⊙ à ☽'s Apogee

III. Eq. Moon.

Arg. Sun à Moon's Mode.

Arg. proper.	S. 0, 6 } −	S. 1, 7 } −	S. 2, 8 } +	Arg. prop.
°	′ ″	′ ″	′ ″	°
0	0 0	0 41	0 41	30
1	0 2	0 41	0 40	29
2	0 3	0 42	0 39	28
3	0 5	0 43	0 38	27
4	0 7	0 44	0 37	26
5	0 8	0 44	0 36	25
6	0 10	0 45	0 35	24
7	0 11	0 45	0 34	23
8	0 13	0 46	0 33	22
9	0 15	0 46	0 31	21
10	0 16	0 46	0 30	20
11	0 18	0 47	0 29	19
12	0 19	0 47	0 28	18
13	0 21	0 47	0 26	17
14	0 22	0 47	0 25	16
15	0 24	0 47	0 24	15
16	0 25	0 47	0 22	14
17	0 26	0 47	0 21	13
18	0 28	0 47	0 19	12
19	0 29	0 47	0 18	11
20	0 30	0 46	0 16	10
21	0 31	0 46	0 15	9
22	0 33	0 46	0 13	8
23	0 34	0 45	0 11	7
24	0 35	0 45	0 10	6
25	0 36	0 44	0 8	5
26	0 37	0 43	0 7	4
27	0 38	0 43	0 5	3
28	0 39	0 42	0 3	2
29	0 40	0 41	0 2	1
30	0 41	0 41	0 0	0
Arg. proper.	S. 5, 11 } +	S. 4, 10 } +	S. 3, 9 } +	Arg. prop.

	IV. Equat. Moon.			V. Eq. Moon.			VI. Eq. Moon.			VII. Eq. Moon.			
	Arg. Mean Evection + 2 ⊙ à ☽'s ☊.			*Arg.* Mean Evection + 2 ☽ M. Anom.			*Arg.* Mean Evection − ⊙'s Mean Anom.			*Arg.* Mean Anomaly ☽ − ⊙ M. Anom.			
Arg. proper.	S. 0 } + 6 } −	S. 1 } + 7 } −	S. 2 } + 8 } −	S. 0 } + 6 } −	S. 1 } + 7 } −	S. 2 } + 8 } −	S. 0 } + 6 } −	S. 7 } + 1 } −	S. 2 } + 8 } −	S 0 } + 6 } −	S. 1 } + 7 } −	S. 2 } + 8 } −	Arg. proper.
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
0	0 0	0 30	0 52	0 0	0 42	1 14	0 0	1 37	2 49	0 0	0 25	0 44	30
1	0 1	0 31	0 52	0 1	0 44	1 14	0 3	1 41	2 49	0 1	0 26	0 44	29
2	0 2	0 32	0 53	0 2	0 46	1 15	0 7	1 44	2 51	0 2	0 27	0 45	28
3	0 3	0 32	0 53	0 4	0 47	1 15	0 10	1 47	2 53	0 3	0 28	0 45	27
4	0 4	0 33	0 54	0 6	0 48	1 16	0 14	1 49	2 56	0 4	0 28	0 46	26
5	0 5	0 34	0 54	0 8	0 49	1 16	0 17	1 52	2 58	0 5	0 29	0 46	25
6	0 6	0 35	0 55	0 10	0 50	1 17	0 20	1 55	2 59	0 5	0 30	0 46	24
7	0 7	0 36	0 55	0 12	0 51	1 17	0 23	1 57	3 0	0 6	0 30	0 47	23
8	0 8	0 36	0 56	0 13	0 52	1 18	0 27	2 0	3 1	0 7	0 31	0 47	22
9	0 9	0 37	0 56	0 14	0 53	1 18	0 30	2 2	3 2	0 8	0 31	0 47	21
10	0 10	0 38	0 56	0 15	0 54	1 19	0 34	2 5	3 3	0 9	0 32	0 48	20
11	0 11	0 39	0 57	0 17	0 55	1 19	0 37	2 8	3 5	0 10	0 33	0 48	19
12	0 12	0 39	0 57	0 18	0 56	1 20	0 40	2 11	3 6	0 10	0 34	0 48	18
13	0 13	0 40	0 57	0 19	0 57	1 20	0 43	2 13	3 6	0 11	0 34	0 48	17
14	0 14	0 41	0 58	0 20	0 58	1 21	0 47	2 16	3 7	0 12	0 35	0 48	16
15	0 15	0 42	0 58	0 21	0 59	1 21	0 50	2 18	3 9	0 13	0 35	0 49	15
16	0 16	0 42	0 58	0 22	1 0	1 22	0 54	2 20	3 10	0 14	0 36	0 49	14
17	0 17	0 43	0 58	0 23	1 1	1 22	0 57	2 23	3 10	0 15	0 37	0 49	13
18	0 18	0 44	0 59	0 25	1 2	1 22	0 59	2 25	3 10	0 15	0 37	0 49	12
19	0 19	0 45	0 59	0 26	1 3	1 23	1 2	2 27	3 11	0 16	0 38	0 49	11
20	0 20	0 46	0 59	0 28	1 4	1 23	1 6	2 30	3 12	0 17	0 39	0 49	10
21	0 21	0 47	0 59	0 30	1 5	1 23	1 9	2 32	3 13	0 18	0 39	0 50	9
22	0 22	0 47	0 59	0 31	1 6	1 24	1 12	2 34	3 13	0 19	0 40	0 50	8
23	0 23	0 48	1 0	0 33	1 7	1 24	1 16	2 35	3 14	0 20	0 40	0 50	7
24	0 24	0 48	1 0	0 35	1 8	1 24	1 20	2 37	3 14	0 21	0 41	0 50	6
25	0 25	0 49	1 0	0 36	1 9	1 24	1 23	2 39	3 15	0 21	0 41	0 50	5
26	0 26	0 49	1 0	0 37	1 10	1 25	1 25	2 41	3 15	0 22	0 42	0 50	4
27	0 27	0 50	1 0	0 38	1 11	1 25	1 28	2 43	3 15	0 23	0 42	0 50	3
28	0 28	0 51	1 0	0 40	1 12	1 25	1 32	2 45	3 15	0 24	0 43	0 50	2
29	0 29	0 51	1 0	0 41	1 13	1 25	1 34	2 47	3 15	0 24	0 43	0 50	1
30	0 30	0 52	1 0	0 42	1 14	1 25	1 37	2 49	3 15	0 25	0 44	0 50	0
Arg. proper.	S. 5 } + 11 } −	S. 4 } + 10 } −	S. 3 } + 9 } −	S. 5 } + 11 } −	S. 4 } + 10 } −	S. 3 } + 9 } −	S 5 } + 11 } −	S 4 } + 10 } −	S. 3 } + 9 } −	S. 5 } + 11 } −	S. 4 } + 10 } −	S. 3 } + 9 } −	Arg proper.

VIII. Mean Elliptic EQUATION of the MOON's CENTER, according to ,0550; the Mean Eccentricity of her Orbit to Radius 1; or of 55050 Eccentricity to Sem. Transf. 1000000, or mean Diſtance à ⊖.

Argument. MOON's corrected ANOMALY.

☽ cor. An.	Sign 0.		Sig. 1.		Sig. 2.		Sig. 3.		Sig. 4.		Sig. 5.		☽ cor. An.
	—	Dif.	—	Dif.	—	Dif.	—	Dif.	—	Dif.	—	Dif.	
°	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	″ ′	°
0	0 0 0	6 11	2 58 30	5 28	5 16 25	3 28	6 17 44	0 24	5 38 54	3 5	3 21 6	5 59	30
1	0 6 11	6 11	3 3 58	5 26	5 19 53	3 21	6 18 8	0 17	5 35 49	3 13	3 15 7	6 3	29
2	0 12 22	6 10	3 9 24	5 22	5 23 14	3 16	6 18 25	0 10	5 32 36	3 19	3 9 4	6 7	28
3	0 18 32	6 10	3 14 46	5 19	5 26 30	3 12	6 18 35	0 3	5 29 17	3 27	3 2 57	6 13	27
4	0 24 42	6 10	3 20 5	5 16	5 29 42	3 6	6 18 38	0 4	5 25 50	3 32	2 56 44	6 15	26
5	0 30 52	6 10	3 25 21	5 14	5 32 48	3 0	6 18 34	0 11	5 22 18	3 39	2 50 29	6 18	25
6	0 37 2	6 9	3 30 35	5 10	5 35 48	2 55	6 18 23	0 18	5 18 39	3 46	2 44 11	6 23	24
7	0 43 11	6 8	3 35 45	5 6	5 38 43	2 39	6 18 5	0 24	5 14 53	3 52	2 37 48	6 25	23
8	0 49 19	6 7	3 40 51	5 4	5 41 32	2 43	6 17 41	0 32	5 11 1	3 58	2 31 23	6 30	22
9	0 55 26	6 6	3 45 55	5 0	5 44 15	2 38	6 17 9	0 39	5 7 3	4 6	2 24 53	6 33	21
10	1 1 32	6 6	3 50 55	4 55	5 46 53	2 32	6 16 30	0 45	5 2 57	4 11	2 18 20	6 37	20
11	1 7 38	6 5	3 55 50	4 53	5 49 25	2 26	6 15 45	0 53	4 58 46	4 17	2 11 45	6 39	19
12	1 13 43	6 3	4 0 43	4 49	5 51 51	2 20	6 14 52	1 0	4 54 29	4 24	2 5 6	6 41	18
13	1 19 46	6 2	4 5 32	4 45	5 54 11	2 13	6 13 52	1 8	4 50 5	4 30	1 58 25	6 44	17
14	1 25 48	6 2	4 10 17	4 40	5 46 24	2 8	6 12 44	1 14	4 45 35	4 36	1 51 41	6 47	16
15	1 31 50	6 0	4 14 57	4 37	5 58 32	2 2	6 11 30	1 21	4 40 59	4 41	1 44 54	6 49	15
16	1 37 50	5 58	4 19 34	4 33	6 0 34	1 55	6 10 9	1 29	4 36 18	4 47	1 38 5	6 51	14
17	1 43 48	5 57	4 24 7	4 29	6 2 29	1 49	6 8 40	1 35	4 31 31	4 54	1 31 14	6 53	13
18	1 49 45	5 55	4 28 36	4 24	6 4 18	1 44	6 7 5	1 42	4 26 37	4 58	1 24 21	6 55	12
19	1 55 40	5 53	4 33 0	4 20	6 6 2	1 36	6 5 23	1 49	4 21 39	5 5	1 17 26	6 55	11
20	2 1 33	5 51	4 37 20	4 16	6 7 38	1 30	6 3 34	1 57	4 16 34	5 9	1 10 29	6 58	10
21	2 7 24	5 50	4 41 36	4 11	6 9 8	1 24	6 1 37	2 3	4 11 25	5 16	1 3 31	7 1	9
22	2 13 14	5 47	4 45 47	4 6	6 10 32	1 17	5 59 34	2 11	4 6 9	5 20	0 56 30	7 1	8
23	2 19 1	5 45	4 49 53	4 2	6 11 49	1 11	5 57 23	2 17	4 0 49	5 25	0 49 29	7 1	7
24	2 24 46	5 44	4 53 55	3 58	6 13 0	1 4	5 55 6	2 25	3 55 24	5 32	0 42 28	7 3	6
25	2 30 30	5 41	4 57 53	3 52	6 14 4	0 57	5 52 41	2 31	3 49 52	5 36	0 35 25	7 4	5
26	2 36 11	5 38	5 1 45	3 47	6 15 1	0 51	5 50 10	2 38	3 44 16	5 40	0 28 21	7 5	4
27	2 41 49	5 35	5 5 32	3 43	6 15 52	0 44	5 47 32	2 46	3 38 36	5 46	0 21 16	7 5	3
28	2 47 26	5 32	5 9 15	3 37	6 16 36	0 37	5 44 46	2 53	3 32 50	5 50	0 14 11	7 5	2
29	2 52 58	5 32	5 12 52	3 33	6 17 13	0 31	5 41 53	2 59	3 27 0	5 54	0 7 6	7 6	1
30	2 58 30		5 16 25		6 17 44		5 38 54		3 21 6		0 0 0		0
	+	Dif.	+	Dif.	+	Dif.	+	Dif.	+	Dif.	+	Dif.	
☽ cor. An.	Sig. 11.		Sig. 10.		Sig. 9.		Sig. 8.		Sig. 7.		Sig. 6.		☽ cor. An.

IX. EVECTION-EQUATION of the MOON: Or Second EQUATION of the MOON's CENTER.

Argument. True Evection; Or M. Evection ∓ $\frac{1}{2}$ M. Equation of the Moon's Center, according to its Title.

True Evec.	Sign 0.		Sign 1.		Sign 2.		Sign 3.		Sign 4.		Sign 5.		True Evec.
	—	Diff.	—	Diff.	—	Diff.	—	Diff.	—	Diff.	—	Diff.	
°	° ′ ″	″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	″	°
0	0 0 0		0 39 42		1 9 7		1 20 25		1 10 9		0 40 43		30
1	0 1 24	1 24	0 40 54	1 12	1 9 49	0 42	1 20 26	0 1	1 9 27	0 42	0 39 30	1 13	29
2	0 2 47	1 23	0 42 5	1 11	1 10 30	0 41	1 20 25	0 1	1 8 44	0 43	0 38 16	1 14	28
3	0 4 10	1 23	0 43 16	1 11	1 11 10	0 40	1 20 22	0 3	1 7 59	0 45	0 37 0	1 16	27
4	0 5 33	1 23	0 44 26	1 10	1 11 49	0 39	1 20 18	0 4	1 7 13	0 46	0 35 43	1 17	26
5	0 6 56	1 23	0 45 35	1 9	1 12 25	0 36	1 20 13	0 5	1 6 27	0 46	0 34 26	1 17	25
6	0 8 19	1 23	0 46 43	1 8	1 11 1	0 36	1 20 6	0 7	1 5 39	0 48	0 33 9	1 17	24
7	0 9 42	1 23	0 47 50	1 7	1 13 35	0 34	1 19 58	0 8	1 4 49	0 50	0 31 51	1 18	23
8	0 11 4	1 22	0 48 56	1 6	1 14 8	0 33	1 19 48	0 10	1 3 58	0 51	0 30 32	1 19	22
9	0 12 26	1 22	0 50 1	1 5	1 14 40	0 32	1 19 37	0 11	1 3 5	0 53	0 29 13	1 19	21
10	0 13 48	1 22	0 51 6	1 5	1 15 11	0 31	1 19 24	0 13	1 2 11	0 54	0 27 53	1 20	20
11	0 15 10	1 22	0 52 10	1 4	1 15 40	0 29	1 19 10	0 14	1 1 17	0 54	0 26 33	1 20	19
12	0 16 30	1 21	0 53 13	1 3	1 16 8	0 28	1 18 54	0 16	1 0 31	0 56	0 25 12	1 21	18
13	0 17 51	1 20	0 54 15	1 2	1 16 34	0 26	1 18 37	0 17	0 59 24	0 57	0 23 50	1 22	17
14	0 19 11	1 20	0 55 16	1 1	1 16 59	0 25	1 18 18	0 19	0 58 26	0 58	0 22 28	1 22	16
15	0 20 31	1 20	0 56 16	1 0	1 17 22	0 23	1 17 59	0 19	0 57 27	0 59	0 21 7	1 22	15
16	0 21 51	1 20	0 57 16	1 0	1 17 44	0 22	1 17 37	0 22	0 56 27	1 0	0 19 44	1 23	14
17	0 23 11	1 20	0 58 14	0 58	1 18 5	0 21	1 17 14	0 23	0 55 26	1 1	0 18 21	1 23	13
18	0 24 30	1 19	0 59 11	0 57	1 18 24	0 19	1 16 50	0 24	0 54 24	1 2	0 16 57	1 24	12
19	0 25 49	1 19	1 0 7	0 56	1 18 42	0 18	1 16 24	0 26	0 53 21	1 3	0 15 33	1 24	11
20	0 27 7	1 18	1 1 2	0 55	1 18 59	0 17	1 15 57	0 27	0 52 16	1 5	0 14 9	1 24	10
21	0 28 25	1 18	1 1 56	0 54	1 19 14	0 15	1 15 28	0 29	0 51 11	1 5	0 12 46	1 23	9
22	0 29 43	1 18	1 2 48	0 52	1 19 28	0 14	1 14 58	0 30	0 50 5	1 6	0 11 22	1 24	8
23	0 31 0	1 17	1 3 40	0 52	1 19 40	0 12	1 14 27	0 31	0 48 58	1 7	0 9 57	1 25	7
24	0 32 16	1 16	1 4 31	0 51	1 19 51	0 11	1 13 54	0 33	0 47 50	1 8	0 8 32	1 25	6
25	0 33 32	1 16	1 5 20	0 49	1 20 0	0 9	1 13 20	0 34	0 46 41	1 9	0 7 7	1 25	5
26	0 34 47	1 15	1 6 8	0 48	1 20 8	0 8	1 12 44	0 36	0 45 31	1 10	0 5 42	1 25	4
27	0 36 2	1 15	1 6 55	0 47	1 20 14	0 6	1 12 7	0 37	0 44 21	1 10	0 4 18	1 25	3
28	0 37 16	1 14	1 7 40	0 45	1 20 19	0 5	1 11 29	0 38	0 43 9	1 12	0 2 52	1 25	2
29	0 38 29	1 13	1 8 24	0 44	1 20 23	0 4	1 10 50	0 39	0 41 56	1 13	0 1 26	1 26	1
30	0 39 42	1 13	1 9 7	0 43	1 20 25	0 2	1 10 9	0 41	0 40 43	1 13	0 0 0	1 26	0
True Evec.	+	Diff.	+	Diff.	+	Diff.	+	Diff.	+	Diff.	+	Diff.	True Evec.
	Sign 11.		Sign 10.		Sign 9.		Sign 8.		Sign 7.		Sign 6.		

X.

X. COMPOUND VARIATION-EQUATION of the MOON.

Argument. MOON Equated from the SUN's True PLACE.

☽ eq. à ☉ true.	Sign 0. +	Diff.	Sign 1. +	Diff.	Sign 2. ±	Diff.	Sign 3. −	Diff.	Sign 4. −	Diff.	Sign 5. −	Diff.	☽ eq. à ☉ true.
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
0	0 0		32 19		31 12		2 0		34 26		34 3		30
1	1 19	1 19	32 56	0 37	30 29	0 43	3 19	1 19	35 4	0 38	33 21	0 42	29
2	2 38	1 19	33 30	0 34	29 43	0 46	4 38	1 19	35 40	0 36	32 36	0 45	28
3	3 57	1 19	34 1	0 31	28 55	0 48	5 57	1 19	36 13	0 33	31 49	0 47	27
4	5 15	1 18	34 29	0 28	28 6	0 49	7 15	1 18	36 43	0 30	30 59	0 50	26
5	6 33	1 18	34 55	0 26	27 15	0 51	8 32	1 17	37 11	0 28	30 8	0 51	25
6	7 50	1 17	35 19	0 24	26 22	0 53	9 48	1 16	37 37	0 26	29 14	0 54	24
7	9 6	1 16	35 40	0 21	25 27	0 55	11 4	1 16	37 59	0 22	28 17	0 57	23
8	10 22	1 16	35 58	0 18	24 30	0 57	12 19	1 15	38 19	0 20	27 19	0 58	22
9	11 38	1 16	36 14	0 16	23 31	0 59	13 34	1 15	38 36	0 17	26 19	1 0	21
10	12 53	1 15	36 27	0 13	22 30	1 1	14 48	1 14	38 51	0 15	25 17	1 2	20
11	14 7	1 14	36 37	0 10	21 27	1 3	16 2	1 14	39 3	0 12	24 13	1 4	19
12	15 20	1 13	36 44	0 7	20 23	1 4	17 15	1 13	39 12	0 9	23 7	1 6	18
13	16 31	1 11	36 49	0 4	19 17	1 6	18 27	1 12	39 18	0 6	22 0	1 7	17
14	17 40	1 9	36 50	0 1	18 10	1 7	19 37	1 10	39 22	0 4	20 51	1 9	16
15	18 48	1 8	36 49	0 1	17 1	1 9	20 46	1 9	39 21	0 1	19 41	1 10	15
16	19 55	1 7	36 45	0 4	15 50	1 11	21 53	1 7	39 20	0 1	18 29	1 12	14
17	21 0	1 5	36 38	0 7	14 38	1 12	22 58	1 5	39 15	0 5	17 16	1 13	13
18	22 4	1 4	36 29	0 9	13 26	1 14	24 1	1 3	39 8	0 7	16 1	1 15	12
19	23 7	1 3	36 17	0 12	12 13	1 13	25 3	1 2	38 58	0 10	14 44	1 17	11
20	24 8	1 1	36 3	0 14	10 59	1 14	26 4	1 1	38 45	0 13	13 27	1 17	10
21	25 7	0 59	35 46	0 17	9 43	1 16	27 4	1 0	38 29	0 16	12 9	1 18	9
22	26 4	0 57	35 26	0 20	8 27	1 16	28 2	1 58	38 10	0 19	10 51	1 18	8
23	26 59	0 55	35 3	0 23	7 10	1 17	28 58	1 56	37 49	0 21	9 32	1 19	7
24	27 51	0 52	34 38	0 25	5 52	1 18	29 52	1 54	37 25	0 24	8 12	1 20	6
25	28 41	0 50	34 10	0 28	4 34	1 18	30 43	1 51	36 58	0 27	6 51	1 21	5
26	29 29	0 48	33 39	0 31	3 16	1 18	31 32	1 49	36 28	0 30	5 30	1 21	4
27	30 15	0 46	33 6	0 33	1 57	1 19	32 19	0 47	35 55	0 33	4 8	1 22	3
28	30 58	0 43	32 30	0 36	0 38	1 19	33 4	0 45	35 20	0 35	2 46	1 21	2
29	31 39	0 41	31 52	0 38	0 41	1 19	33 46	0 42	34 43	0 37	1 23	1 23	1
30	32 19	0 40	31 12	0 40	2 0	1 19	34 26	0 40	34 3	0 40	0 0	1 23	0
☽ eq. à ☉ true.	−	Diff.	−	Diff.	∓	Diff.	+	Diff.	+	Diff.	+	Diff.	☽ eq. à ☉ true
	Sign 10.		Sign 10.		Sign 9.		Sign 8.		Sign 7.		Sign 6.		

CORRECTION

CORRECTION of Mean VARIATION,
By Decimal Multipliers.

To be *added* to, or *ſubtracted* from, according to its Title, the preceding *Compound Variation.*

Eq. of M. Va. ☽ in Oct. or M. Diſ. ⊙ to Va. in Perig. and Apog. ⊙ à ⊖. Arg. ☽ à ⊙ Signs and Degrees.				*Argument.* Sun's Mean ANOMALY. *Signs* and *Degrees.*						
Arg. proper.	0	1	2	0	1	2	3	4	5	Arg. proper.
	—	—	—	× rs.	× rs.	× rs.	× rs.	× rs.	× rs.	
	6	7	8							
	+	+	+							
°	″	″	″	Dec.	Dec.	Dec.	Dec.	Dec.	Dec.	°
0	0	107	107	,92	,80	,48	,02	,49	,86	30
1	4	109	105	,92	,80	,47	,00	,51	,87	29
2	8	111	103	,92	,79	,45	,02	,52	,88	28
3	13	112	101	,92	,78	,43	,04	,54	,89	27
4	18	114	98	,92	,77	,41	,05	,55	,89	26
5	22	116	95	,92	,76	,40	,07	,56	,90	25
6	26	117	92	,91	,75	,38	,09	,58	,91	24
7	30	119	89	,91	,74	,36	,10	,59	,91	23
8	34	120	86	,91	,73	,35	,12	,60	,92	22
9	38	121	83	,91	,72	,34	,14	,62	,92	21
10	42	122	80	,90	,71	,33	,16	,63	,93	20
11	46	123	77	,90	,70	,31	,18	,65	,94	19
12	50	123	74	,90	,69	,30	,20	,66	,95	18
13	54	124	70	,90	,68	,28	,21	,68	,95	17
14	58	124	66	,89	,67	,26	,22	,69	,96	16
15	62	124	62	,89	,66	,25	,24	,70	,96	15
16	66	124	58	,89	,65	,24	,25	,71	,97	14
17	70	124	54	,88	,64	,22	,27	,72	,97	13
18	74	123	50	,88	,63	,20	,28	,73	,97	12
19	77	123	46	,88	,62	,18	,30	,75	,98	11
20	80	122	42	,87	,61	,17	,32	,76	,98	10
21	83	121	38	,87	,60	,16	,34	,77	,99	9
22	86	120	34	,86	,59	,14	,36	,78	,99	8
23	89	119	30	,86	,58	,12	,37	,79	,99	7
24	92	117	26	,85	,57	,10	,39	,80	,99	6
25	95	116	22	,85	,55	,09	,41	,81	1,00	5
26	98	114	18	,84	,54	,07	,42	,82	1,00	4
27	101	112	14	,83	,52	,05	,43	,83	1,00	3
28	103	111	9	,82	,51	,04	,45	,84	1,00	2
29	105	109	4	,81	,50	,03	,47	,85	1,00	1
30	107	107	0	,80	,48	,02	,49	,86	1,00	0
Arg. proper.	—	—	—	× rs.	× rs.	× rs.	× rs.	× rs.	× rs.	Arg. proper.
	11	10	9							
	+	+	+	11	10	9	8	7	6	
	5	4	3							

XI. Mean REDUCTION-EQUATION of the MOON to the ECLIPTIC.

Arg. Moon in Orb. à ☊
1 eq.

☽ à ☊	0.6		1.7		2.8		☽ à ☊
	—		—		—		
°	′	″	′	″	′	″	°
0	0	0	6	2	6	2	30
1	0	14	6	9	5	55	29
2	0	29	6	15	5	47	28
3	0	43	6	21	5	39	27
4	0	58	6	27	5	30	26
5	1	12	6	32	5	20	25
6	1	26	6	37	5	10	24
7	1	41	6	41	5	0	23
8	1	55	6	45	4	50	22
9	2	9	6	48	4	39	21
10	2	23	6	51	4	28	20
11	2	37	6	54	4	17	19
12	2	50	6	56	4	5	18
13	3	3	6	57	3	53	17
14	3	16	6	57	3	41	16
15	3	29	6	57	3	29	15
16	3	41	6	57	3	16	14
17	3	53	6	57	3	3	13
18	4	5	6	56	2	50	12
19	4	17	6	54	2	37	11
20	4	28	6	51	2	23	10
21	4	39	6	48	2	9	9
22	4	50	6	45	1	55	8
23	5	0	6	41	1	41	7
24	5	10	6	37	1	26	6
25	5	20	6	32	1	12	5
26	5	30	6	27	0	58	4
27	5	39	6	21	0	43	3
28	5	47	6	15	0	29	2
29	5	55	6	9	0	14	1
30	6	2	6	2	0	0	0
☽ à ☊	+		+		+		☽ à ☊
	11.5		10.4		9.3		

MOON's Mean LATITUDE.

At the mean Inclination of her Orbit.

Argument. ☽ in Orb. from the Node 1 eq.

I. EQUATION of the MOON's mean to her True LATITUDE, for the preſent Inclin. of her Orb.

Arg. 2 ☽ à ⊙ — forego. Ar. Lat.

II. EQUATION of MOON's Latitude.

Arg. 1 Equa. — ⊙ Anom.

Arg. pro.	0 . N	Diff	1 . N	Diff.	2 . N	Diff.	0 . N	1 . N	2 . N	0 . S	1 . S	2 . S	Arg. proper.
	6 . S		7 . S		8 . S		6 . S	7 . S	8 . S	6 . N	7 . N	8 . N	
°	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
0	0 0 0	5 22	2 34 4	4 38	4 27 2	2 40	0 0	4 25	7 40	0 0	0 14	0 24	30
1	0 5 22	5 23	2 38 42	4 36	4 29 42	2 34	0 9	4 33	7 45	0 0	0 14	0 24	29
2	0 10 45	5 22	2 43 18	4 32	4 32 16	2 30	0 18	4 41	7 49	0 1	0 14	0 24	28
3	0 16 7	5 22	2 47 50	4 30	4 34 46	2 24	0 28	4 49	7 54	0 1	0 15	0 24	27
4	0 21 29	5 22	2 52 20	4 25	4 37 10	2 19	0 37	4 57	7 58	0 2	0 15	0 25	26
5	0 26 51	5 21	2 56 45	4 24	4 39 29	2 14	0 46	5 4	8 2	0 2	0 15	0 25	25
6	0 32 12	5 20	3 1 9	4 19	4 41 43	2 9	0 55	5 12	8 6	0 3	0 16	0 25	24
7	0 37 32	5 20	3 5 28	4 17	4 43 52	2 4	1 4	5 19	8 9	0 3	0 16	0 25	23
8	0 42 52	5 19	3 9 45	4 13	4 45 56	1 59	1 14	5 27	8 13	0 4	0 16	0 26	22
9	0 48 11	5 18	3 13 58	4 9	4 47 55	1 54	1 23	5 34	8 16	0 4	0 17	0 26	21
10	0 53 29	5 17	3 18 7	4 5	4 49 49	1 47	1 32	5 41	8 20	0 5	0 17	0 26	20
11	0 58 46	5 17	3 22 12	4 2	4 51 36	1 43	1 41	5 48	8 23	0 5	0 18	0 26	19
12	1 4 3	5 15	3 26 14	3 59	4 53 19	1 38	1 50	5 55	8 26	0 6	0 18	0 26	18
13	1 9 18	5 14	3 30 13	3 54	4 54 57	1 32	1 59	6 2	8 29	0 6	0 18	0 26	17
14	1 14 32	5 12	3 34 7	3 51	4 56 29	1 27	2 8	6 9	8 31	0 7	0 19	0 27	16
15	1 19 44	5 11	3 37 58	3 46	4 57 56	1 20	2 17	6 16	8 34	0 7	0 19	0 27	15
16	1 24 55	5 9	3 41 44	3 43	4 59 16	1 16	2 26	6 22	8 36	0 8	0 19	0 27	14
17	1 30 4	5 7	3 45 27	3 38	5 0 32	1 10	2 35	6 29	8 39	0 8	0 20	0 27	13
18	1 35 12	5 6	3 49 5	3 35	5 1 42	1 4	2 44	6 34	8 41	0 9	0 20	0 27	12
19	1 40 18	5 4	3 52 40	3 30	5 2 46	0 59	2 53	6 41	8 42	0 9	0 20	0 27	11
20	1 45 22	5 3	3 56 10	3 25	5 3 45	0 54	3 1	6 47	8 44	0 10	0 21	0 27	10
21	1 50 25	5 0	3 59 35	3 22	5 4 39	0 48	3 10	6 53	8 46	0 10	0 21	0 27	9
22	1 55 25	4 58	4 2 57	3 16	5 5 27	0 42	3 19	6 59	8 47	0 11	0 21	0 28	8
23	2 0 23	4 56	4 6 13	3 13	5 6 9	0 36	3 27	7 4	8 48	0 11	0 22	0 28	7
24	2 5 19	4 54	4 9 26	3 7	5 6 45	0 31	3 35	7 10	8 49	0 12	0 22	0 28	6
25	2 10 13	4 51	4 12 33	3 4	5 7 16	0 26	3 44	7 15	8 50	0 12	0 22	0 28	5
26	2 15 4	4 49	4 15 37	2 58	5 7 42	0 20	3 52	7 21	8 51	0 13	0 22	0 28	4
27	2 19 53	4 46	4 18 35	2 54	5 8 2	0 14	4 1	7 26	8 52	0 13	0 23	0 28	3
28	2 24 39	4 44	4 21 29	2 49	5 8 16	0 8	4 9	7 31	8 52	0 13	0 23	0 28	2
29	2 29 23	4 41	4 24 18	2 44	5 8 24	0 4	4 17	7 36	8 52	0 13	0 23	0 28	1
30	2 34 4		4 27 2		5 8 28		4 25	7 40	8 52	0 14	0 24	0 28	0
Arg. prop.	11.S	Diff.	10 . S	Diff	9 . S	Diff.	11 . S	10 . S	9 . S	11 . N	10 . N	9 . N	Arg. proper.
	5 . N		4 . N		3 . N		5 . N	4 . N	3 . N	5 . S	4 . S	3 . S	

MEAN HORIZONTAL PARALLAX of the MOON in Syzigies to the mean State of her Orbit. Her mean Eccentricity being ,55050. Radius 10,00000.

Arg. Moon's M. Anomaly, 7 equated.

Moon's eq. Anom.	Sig. 0.		Sig. I.		Sig. II.		Sig. III.		Sig. IV.		Sig. V.		Moon's eq. Anom.
	+		+		+		+		+		+		
°	′	″	′	″	′	″	′	″	′	″	′	″	°
0	54	37	54	57	55	56	57	24	59	5	60	26	30
1	54	37	54	59	55	59	57	27	59	9	60	28	29
2	54	37	55	0	56	1	57	31	59	12	60	30	28
3	54	37	55	2	56	4	57	34	59	15	60	32	27
4	54	38	55	3	56	6	57	38	59	18	60	33	26
5	54	38	55	5	56	9	57	41	59	21	60	34	25
6	54	38	55	6	56	12	57	45	59	24	60	36	24
7	54	38	55	8	56	14	57	49	59	27	60	37	23
8	54	38	55	9	56	17	57	52	59	30	60	38	22
9	54	39	55	11	56	20	57	56	59	33	60	39	21
10	54	39	55	12	56	22	57	59	59	36	60	41	20
11	54	39	55	15	56	25	58	2	59	39	60	42	19
12	54	40	55	16	56	28	58	6	59	42	60	43	18
13	54	40	55	18	56	31	58	9	59	45	60	44	17
14	54	41	55	20	56	34	58	13	59	47	60	45	16
15	54	42	55	22	56	38	58	16	59	50	60	46	15
16	54	42	53	24	56	41	58	19	59	53	60	47	14
17	54	43	55	26	56	44	58	21	59	56	60	48	13
18	54	44	55	28	56	47	58	25	59	59	60	49	12
19	54	45	55	30	56	50	58	28	60	1	60	50	11
20	54	46	55	32	56	53	58	31	60	4	60	50	10
21	54	47	55	34	56	56	58	35	60	6	60	51	9
22	54	48	55	36	56	59	58	39	60	9	60	51	8
23	54	49	55	39	57	2	58	42	60	11	60	52	7
24	54	50	55	41	57	5	58	46	60	14	60	52	6
25	54	51	55	44	57	8	58	49	60	16	60	53	5
26	54	52	55	46	57	11	58	52	60	18	60	53	4
27	54	53	55	49	57	15	58	56	60	20	60	54	3
28	54	55	55	51	57	18	58	59	60	22	60	54	2
29	54	56	55	54	57	21	59	2	60	24	60	54	1
30	54	57	55	56	57	24	59	5	60	26	60	54	0
Moon's eq. Anom.	+		+		+		+		+		+		Moon's eq. Anom.
	Sig. XI.		Sig. X.		Sig. IX.		S. VIII.		S. VII.		Sig. VI.		

N. B. Moon's Diameter to her Horiz. Parallax. 6 : 11.

I. EQUATION of ☽'s hor. Parallax.

Arg. Mean *Evection.*

Arg. prop.	0	1	2
	6	7	8
	+	+	+
°	″	″	″
0	42	36	21
1	42	35	20
2	42	35	19
3	42	35	18
4	42	34	18
5	42	34	17
6	41	34	17
7	41	33	16
8	41	33	15
9	41	33	15
10	41	32	14
11	41	32	14
12	40	31	13
13	40	31	12
14	40	31	11
15	40	30	10
16	40	30	9
17	40	29	9
18	40	29	8
19	39	28	7
20	39	27	6
21	39	26	5
22	39	25	5
23	38	25	4
24	38	24	4
25	37	24	3
26	37	23	3
27	37	23	2
28	36	22	1
29	36	22	1
30	36	21	0
A g. prop.	11	10	9
	+	+	+
	5	4	3

II. EQUATION of ☽'s hor. Parallax.

Arg. ☽'s true Long. à ☉.

0	1	2	Arg. prop.
6	7	8	
″	″	″	°
0	15	45	30
0	16	46	29
0	17	46	28
0	18	47	27
1	19	47	26
1	20	48	25
1	21	49	24
1	22	50	23
2	23	51	22
2	24	52	21
2	25	52	20
2	26	53	19
3	27	54	18
3	28	54	17
4	29	55	16
4	30	55	15
5	31	56	14
5	33	56	13
6	34	57	12
6	36	57	11
7	37	57	10
7	38	58	9
8	39	58	8
9	40	58	7
10	41	59	6
10	41	59	5
11	42	59	4
12	43	60	3
13	43	60	2
14	44	60	1
15	45	60	0
11	10	9	Arg. prop.
5	4	3	

Hourly

Hourly Motion of the Moon in her Orbit. By Mr. MASKELYNE, ROYAL ASTRONOMER at GREENWICH.

Argument. ☽. M. Anom. 7 eq.

	Sig. 0.		Sig. I.		Sig. II.		Sig. III.		Sig. IV.		Sig. V.		
°	'	''	'	''	'	''	'	''	'	''	'	''	°
0	29	36	29	57	31	2	32	41	34	36	36	9	30
1	29	36	29	59	31	4	32	45	34	40	36	12	29
2	29	36	30	0	31	7	32	49	34	44	36	14	28
3	29	36	30	2	31	9	32	52	34	47	36	17	27
4	29	37	30	3	31	13	32	56	34	51	36	18	26
5	29	37	30	5	31	15	33	0	34	54	36	20	25
6	29	37	30	7	31	19	33	4	34	57	36	22	24
7	29	37	30	8	31	22	33	8	35	1	36	24	23
8	29	37	30	10	31	24	33	12	35	4	36	26	22
9	29	38	30	12	31	28	33	16	35	8	36	28	21
10	29	38	30	14	31	31	33	19	35	11	36	30	20
11	29	38	30	16	31	34	33	23	35	15	36	31	19
12	29	39	30	18	31	38	33	27	35	19	36	33	18
13	29	40	30	20	31	41	33	31	35	22	36	35	17
14	29	40	30	22	31	45	33	35	35	25	36	36	16
15	29	41	30	24	31	47	33	39	35	28	36	37	15
16	29	42	30	26	31	51	33	43	35	31	36	38	14
17	29	43	30	28	31	55	33	47	35	34	36	39	13
18	29	44	30	31	31	57	33	50	35	37	36	40	12
19	29	44	30	33	32	1	33	54	35	40	36	41	11
20	29	45	30	35	32	5	33	58	35	44	36	42	10
21	29	46	30	38	32	8	34	2	35	46	36	43	9
22	29	48	30	40	32	12	34	6	35	49	36	44	8
23	29	49	30	43	32	16	34	9	35	52	36	44	7
24	29	50	30	45	32	19	34	13	35	55	36	45	6
25	29	51	30	48	32	22	34	17	35	57	36	45	5
26	29	52	30	51	32	26	34	21	35	59	36	45	4
27	29	53	30	53	32	30	34	25	36	2	36	46	3
28	29	54	30	56	32	34	34	29	36	4	36	46	2
29	29	56	30	58	32	37	34	32	36	7	36	46	1
30	29	57	31	2	32	41	34	36	36	9	36	46	0
	Sig. XI.		Sig. X.		Sig. IX.		S. VIII.		S. VII.		Sig. VI.		0

I. Equation of ☽ H. Mot.

Arg. M. Evection.

MASKELYNE.

S.	0	1	2	S.
	6	7	8	
	+	+	+	
°	''	''	''	''
0	38	33	19	30
1	38	32	18	29
2	38	32	18	28
3	38	32	17	27
4	38	31	17	26
5	38	31	16	25
6	38	31	16	24
7	37	30	15	23
8	37	30	14	22
9	37	30	14	21
10	37	29	13	20
11	37	29	13	19
12	37	28	12	18
13	37	28	11	17
14	36	28	11	16
15	36	27	10	15
16	36	27	9	14
17	36	26	9	13
18	36	26	8	12
19	35	25	7	11
20	35	25	6	10
21	35	24	6	9
22	35	24	5	8
23	34	23	4	7
24	34	23	4	6
25	34	22	3	5
26	34	21	3	4
27	33	21	2	3
28	33	20	1	2
29	33	20	1	1
30	33	19	0	0
S.	11	10	9	S.
	+	+	+	
	5	4	3	

II. Equation of ☽. Hor. Motion.

Arg. Moon from the Sun.

MASKELYNE.

Sig.	0 6	1 7	2 8	3 9	4 10	5 12
	+	±	−	−	∓	+
°	''	''	''	''	''	''
0	42	21	21	42	21	21
1	42	20	22	42	20	22
2	42	18	23	42	18	23
3	42	17	24	42	17	24
4	42	15	26	42	15	26
5	42	14	27	42	14	27
6	41	13	28	41	13	28
7	41	11	29	41	12	29
8	41	10	30	41	10	30
9	40	8	31	40	8	31
10	40	7	32	40	7	32
11	39	5	33	39	5	33
12	39	4	34	39	4	34
13	38	2	35	38	2	35
14	37	1	36	37	1	36
15	36	0	36	36	0	36
		−			+	
16	36	0	37	36	0	37
17	35	2	38	35	2	38
18	34	5	39	34	5	39
19	33	7	40	33	7	40
20	32	8	40	32	8	40
21	31	9	40	31	9	40
22	30	10	41	30	10	41
23	29	12	41	29	12	41
24	28	13	41	28	13	41
25	27	14	42	27	14	42
26	26	15	42	26	15	42
27	25	17	42	25	17	42
28	24	18	42	24	18	42
29	22	20	42	22	20	42
30	21	21	42	21	21	42

PRECEPTS

FOR

Calculating the MOON'S PLACE out of SYZIGIES.

1. COmpute the true Place of the Sun: and ſet down with it his Mean Longitude and Anomaly.

2. Take out the Radical Place of the Moon, Apogee and Node, with their Motions for the Month, Day, Hour, Minute and Second, and collect them into three different Sums: that of the Node being retrograde muſt be ſubtracted from the Radical Place as is before laid down in the former Precepts.

3. From the Table of Annual Equations in Syzigie, take out the Annual Equations of the Moon and Apogee, applying them as the Sun's M. Anomaly directs. The half of the Equation of the Apogee ſupplies the Equation of the Node with a contrary Title.

4. From the *Mean* Longitude of the Sun ſubtract the *Mean* Place of the Apogee: the remainder is the Mean *Argumentum Annuum*.

5. From the Longitude of the Moon once equated deduct the Place of the Apogee once equated, and you will have the Moon's Mean Anomaly.

6. From the Moon's M. Anomaly, ſubtract the *Argum. Annuum* doubled, and you have the Mean Arg. of Evection for taking out the ſmaller Equations depending on it. It is ſufficient to take out the Arg. of theſe Equations to *Minutes* of a degree only.

7. Having the Arguments of theſe ſeveral Equations thus laid before you, with them enter the Tables, and, as they direct, take out the ſix following Equations (the firſt being already applied to the Moon's Place) and enter them in two Columns, with their Notation of + and —. Collect them into two ſeveral Sums: The Sum or Difference of which, added or ſubtracted, (as the Sum or Exceſs of theſe requires.) from the Longitude of the Moon once equated gives the Moon's Place *ſeven* times equated.

8. This Sum or Difference applied in the ſame Manner to the Mean Anomaly, gives the Mean Anomaly *correct* for taking out the Central Equation.

9. The Central Equation added or ſubtracted from the Moon's Mean Place ſeven times equated gives it equated the eighth time.

10. Add or ſubtract half of the Central Equation, as its Argument directs, from the Mean Anomaly: and you will have the *Eccentric* Anomaly of the Moon in her Orbit: from whence deduct the double *Argumentum Annuum*, as found above; and you have the Argument of the Evection Equation, or *ſecond* Part of the Equation of the Center.

11. With this Argument take out the Evection Equation, and add or ſubtract it as occaſion requires, and you have the Moon's Place 9 times equated.

12. From the Moon's Place 9 times equated ſubtract the true equated Longitude of the Sun; and with the diſtance of the Moon from the Sun enter the Table of Variation: and take out the Mean Variation and the Correction with the ſame Argument ☽ à ☉. With the Sun's M. Anomaly take out the Decimal Multipliers correſpondent to it: and by thoſe diminiſh the Correction. The Correction, ſo proportioned, add to the Mean Variation in the *ſecond* and *third* Quadrant of the Sun's Anomaly and ſubtract in the firſt and fourth, and you have the Variation correct: which added or ſubtracted according to its Argument, gives the Moon's true *Orbit* Longitude.

13. From the Orbit Longitude ſubtract the equated Place of the Moon's Node and you have the Argument of Reduction and Latitude.

14. Enter the Table of Reduction with this Argument, and apply it as it directs to the Orbit Longitude, and you have the Moon's true *Ecliptic* Longitude.

15. From the Table of Equation of the Equinoctial Points (page 7.) take out its Equation according to the Longitude of the Moon's Node, and apply it, as that directs, to the Moon's Place, and it gives the Ecliptic Longitude of the Moon *Correct*.

N. B. It will be more convenient to add to, or ſubtract this ſmall Correction from the Reduction, making it one Equation, as I have done in the Example.

16. Take out the Moon's Mean Latitude as the Argument directs and enter it down.

17. Double the Moon's diſtance from the Sun; and ſubtract from thence the Argument of Latitude; and it gives the Argument of the Latitudes *firſt* Equation.

18. From this Argument ſubtract the Sun's Mean Anomaly; and the remainder is the Argument of the *ſecond* Equation of Latitude.

19. With theſe Arguments take out their reſpective Equations. Their *Sum*, if of the *ſame*, or their *difference*, if of *different* Denominations, added to or ſubtracted from the Mean Latitude, according as the Notation of the Greateſt agrees with or differs from the Notation of Latitude, *South* or *North*, gives the true equated Latitude of the Moon.

The Tables of the Moon's Horizontal Parallax and Hourly Motions are ſo clear and eaſy to be comprehended, that I refer the Computer to the Titles for their Application. For the Moon's Diameter: It is always to the Horizontal Parallax as ſix to eleven: therefore that Parallax multiplied by ſix and divided by eleven, gives at all times her true Diameter: Or the Horizontal Parallax may be diminiſhed in the Ratio of 55 to 30′; for finding the ſame Proportion or Diameter.

EXAMPLE

EXAMPLE II.

For Computing the MOON's PLACE EXTRA SYZIGIA,

Compared with Dr. BRADLEY's Obſervation.

	s	°	′	″
☉. M. Longit.	0	12	50	57
Equated Long.	♈	14	46	4
M. Anomaly.	I. 9	4	22	8
	☽. M. Longit.			
Mean Time.	s	°	′	″
1744	8	23	49	40
March 23	0	0	27	52
Hour 17		9	20	0
38′ 42″	0		21	15
M. Motions.	9	3	58	47
An. Equations.		—	11	22
☽.Ap.☊ 1.eq.	9	3	47	25
6 Equations.		—	3	51
☽. 7. Equat.	9	3	43	34
Ellipt. Equat.	+	2	24	19
☽.8.Equated.	9	6	7	53
Evection Equat.	+	0	8	45
☽.9 Equated.	9	6	16	38
Variation Equa.		+	12	52
☽.Orbit Long.	9	6	29	30
R^n(+Pre.11″)		—	5	28
☽.Ecl^c. Place.	♑	6	24	2
Obſerved.	—	6	24	1
Error Comput.		+	0	1

s	°	′	″	
0	12	50	57	☉.M.Long.
9	27	17	20	☽. M. Ap. —
2	15	33	37	M.Arg.Ann^m.
5	1	7	14	Double A. Ann.

☽'s Apogee.				☽'s Node.			
s	°	′	″	s	°	′	″
9	18	4	17	1	5	45	13
	9	8	8		4	20	32
		4	44			2	15
			11	—	4	22	47
9	27	17	20	1	1	22	26
	+	21	35		—	10	47
9	27	38	55	1	1	11	39
9	3	47	25	9	6	29	30
11	6	8	30	8	5	17	51
	—	3	52				
VIII. 11	6	4	38	☽.M.An. cor.			
+	1	12	9	½ Cent. Equat.			
11	7	16	47	☽.Eccent.An.			
5	1	7	14	Doub.An.Arg.			
IX. 6	6	9	33	Arg. of Evect.			

Arguments of 6 leſs equations.				Equations.			
				—		+	
	s	°	′	′	″	′	″
2	2	15	34	3	11	0	0
3	11	13	34	—	—	0	25
4	5	2	9	—	—	0	28
5	4	17	19	—	—	0	57
6	9	0	39	3	15	0	45
7	2	1	42	6	26	—	
			+	2	35	2	35
	X.6.equati.			3	51	—	
	s	°	′	″			
☽	9	6	16	37	M. Var. 12 55		
☉	0	14	46	14	Eq.☉An. — 3		
X. ☽ à ☉	8	21	31	23	Cor.Var. 12 52 Eq.36″ X^r 08		

	s	°	′
Mean Anomaly.	11	6	8
2 Annual Argument.	5	1	7
Mean Evection — Argument.	6	5	1

Moon's Orbit Longitude.

Arg. of Latitude.

	s	°	′
2. ☽. á ☉.	5	13	28
Arg. Latitude	8	5	18
Arg. 1. Eq. — of Lat.	9	8	10
☉ M. Anom.	9	4	22
Arg. 2. Eq — of Lat.	0	3	48

	°	′	″
Moon's Mean Latitude S.	4	40	9
1. Equation. S.	+	8	47
2. Equation. S.	+	0	2
Moon's Latitude. S. correct	4	48	58

	′	″
☽'s Mean Horizontal Parallax	54	50
1. Equation +	0	42
2. Equation —	0	58
Moon's H. Parallax eq.	54	34
Moon's Horizontal Diameter	29	46

Places of the MOON as obſerved by the late Dr. Bradley, Astronomer-Royal, at Greenwich.

And compared with the Calculation from theſe Tables.

		Equal Time of Obſervation.				Moon's Longitude Obſerved.				Error of Calculation.		
Years.	Months.	D.	H.	'	"	•	°	'	"		'	"
1743	December.	8	2	46	8	♒	6	16	52	+	0	9
	—	13	6	25	48	♈	9	20	15	—	0	7
	—	19	12	1	32	♋	8	18	51	+	0	3
	—	26	18	21	40	♎	22	30	40	—	0	22
1744	March.	23	17	38	42	♑	6	24	1	+	0	1
	April.	20	8	4	38	♌	27	45	41	—	0	54
	May.	13	10	44	0	♏	17	1	57	—	0	49
	—	24	19	28	40	♈	5	34	17	+	0	11
	June.	2	2	55	31	♌	2	50	24	—	0	18
	—	5	5	38	23	♍	17	51	59	—	0	55
	—	18	16	2	51	♓	5	41	19	+	1	38
	September.	1	4	55	23	♐	8	32	0	+	0	47
		15	15	51	15	♊	6	20	56	—	0	33

Sum of all the Errors 434"
Divided by Number of Obſervations } 13
Gives the mean Difference of Error ± 33" 23'''

The Equal Times of the Ecliptic Oppoſition, or of Full-Moon, as obſerved in 29 Eclipſes: taken from the Catalogue of Obſervations as publiſhed by Mr. *T. Mayer* in the COMMENT. GOTTINGENSES, and compared with the Computations from theſe Tables.

The Times reduced to the Meridian of GREENWICH W. of PARIS in Time, — 9′ 16″

Claſs of Obſer.	Year of our Lord	Equal Time. New Stile. Month,	Day	H.	′	″	Error in Time.	′	″	Error in Time by Mayer.	′	″
IX	1686	November	29	11	6	48	+	2	23	+	1	55
XIV	1690	March	24	10	11	29	+	0	8		0	0
XII	1707	April	16	13	38	53	+	1	25	+	1	0
XV	1708	September	29	9	8	56	–	0	44		0	0
XX	1712	January	23	7	54	53	+	0	6	–	0	30
XXVIII	1717	March	26	15	4	38	+	1	53	+	1	40
VIII	1722	June	28	13	52	21	+*	0	2	–	1	0
XI	1724	October	31	15	18	40	–	1	12	+	1	0
XVI	1728	February	24	19	18	14	–	1	9		0	0
XVIII	1729	February	13	8	58	56	–*	1	11	–	1	30
XIX	——	Auguſt	8	13	6	36	+*	0	41	+	1	20
XXII	1731	June	19	13	39	15	–	1	49	+	0	50
XXV	1732	December	1	9	38	42	–*	0	4	+	1	20
XXVI	1733	May	28	7	13	31	–	0	2		0	0
XXIX	1735	October	1	13	10	0	–	0	34	+	0	25
XXX	1736	March	26	12	6	2	–	2	3	–	0	15
I	——	September	19	14	50	25	–*	0	10	+	1	40
II	1737	March	16	4	29	2	–	0	36		0	0
III	——	September	8	15	34	41	–	1	24	+	1	30
V	1739	January	24	11	7	0	–	1	20	–	1	50
VII	1740	January	13	10	33	41	+	0	46	+	1	25
XIII	1743	November	1	14	51	39		0	0		0	0
XVII	1746	Auguſt	30	11	39	14	+	1	47	+	2	0
XVIII	1747	February	24	17	18	37	–	1	39	–	1	30
XXI	1748	Auguſt	8	11	31	35	–	0	2		0	0
XXIII	1749	December	23	7	54	34	–	0	8	+	2	0
XXIV	1750	June	19	8	59	39	–	2	11	–	1	5
XXV	——	December	12	18	20	45	+§	0	14	——		
XXVII	1751	December	2	9	32	30	+	1	11		0	0

Numb. of Obſervat. } 29

Sum – – 1654 | 1535

÷29 | ÷28

Mean – – 0 57″ | 0 52″

Numb. of Obſervat. } 28

REMARKS.

Mr. Mayer does not, (as is manifeſt from his Abacus of Errors in Time,) carry the Compariſon below 15″ or one quarter of a minute, for all below is marked with a Cypher. Nor does he note the Error within 5″ of a Minute, as this Table ſhews: So that though the *Mean* of the Errors in his Catalogue is 5″ *leſs* than thoſe from my Computation; yet if all the Errors in my Abacus below 15″ were rejected: the Mean of the whole would be equal or nearly ſo in both.

The few Errors in the Differences as printed page VIII. of the *Durham Tables*, are here corrected and pointed out by Aſteriſks.

The Obſervation 1750 Dec. 12. marked §. is taken from *Hiſtoire l'Academie des Sciences a Paris*. Mayer not having inſerted it in his Catalogue.

The Obſervations ſelected are the laſt in each Claſs, as probably the moſt accurately obſerved. Claſs VI. omitted, Moon below the Horizon and not viſible.

A Table of ERRATA ſent to the Author by an unknown Hand.

Page 7. in a figure, the Letters S and x wanting.
10. l. 3. for 40° 0′ 30″ read 44° 0′ 30″
12. in Figure, R wanting, p. 14 ditto.
14. in Figure, Z and P ſhould be tranſpd.
ib. as the ∠ at Pole is Obtuſe.
ib. l. 30. for Sun's diſt. r. Zenith diſt.

Lunar Tables.

	Errata.		Corrections.
P.2. l. ult. for	1ˢ 15° 52′ 32″	r.	3ˢ 15° 52′ 32″
4. l. 6.	12 5 17	r.	12 55 17
ib. l. 21.	12 4 36	r.	12 4 26
ib. l. 24.	5 13 44 0	r.	5 13 44 50
ib. l. 25.	7 15 23 [illegible]	r.	7 15 23 31
ib. l. 31.	10 17 27 1	r.	10 4 27 1
8. l. 29.	20 10	r.	21 10
ib. l. 30.	20 15	r.	21 15
19. l. 6.	3 8 49 23	r.	3 8 49 3
ib. l. 8.	3 8 49 38	r.	3 8 49 18
ib. l. 9.	0 11 14 48	r.	0 10 14 28
ib. l. 26.	0 12 10 30	r.	0 12 10 10
ib. l. 27.	11 10 37 48	r.	11 10 37 28
24. Diff.	1 58	r.	0 58
ib. ——	1 56	r.	0 56
ib. ——	1 54	r.	0 54
ib. ——	1 51	r.	0 51
ib. ——	1 49	r.	0 49

31. l. 4. for Mean Anomaly r. ☽. mean ano.
ib. l. 5. for 2 Ann. Arg. r. —2 Ann. Arg.
ib. l. 6. for Mean Evec.—Arg. r. Mean Evec. Arg.
ib. l. ib. for ♈ 14 46 4 r. ♈ 14 46 14

There are ſeveral other ſmall errors of 1 or 2 ſeconds which I have paſſed over.

ERRATA, collected by the Author.

Solar Tables.—Emendment.

Sun's Radical Place 10″ too ſlow throughout.
Page 8. l. 8. for June 27, read June 17.

ib. l. 9.	59′ 9″	r.	59′ 59″
ib. l. 16.	— 0 18	r.	+ 0 2
ib. l. 10.	+ 0 2	r.	— 1 11
ib. l. 11.	— 0 38	r.	+ 0 41

Lunar Tables.

Page 6. l. ult. for 32° 6′ 27″ read 32° 56′ 27″
14. l. 32. under Sun's Anomaly, for 0 9 read 0 8
19. l. 25. for ☽. Ecliptic, r. ☽. 4 Equat.
ib. l. 27. for ☽. 4 Equat. Long. r. ☽. in Ecliptic.
20. l. 5. ☽. Mode, r. ☽ Node.
ib. Arg. for $\left.\begin{matrix}2\\8\end{matrix}\right\}+$ r. $\left.\begin{matrix}2\\8\end{matrix}\right\}-$.
32. l. 9. + 0 3 r. + 0 30.

BRITISH MUSEUM 4 NO 70

ERRATA.

Preface, page vii, lines 3 and 4, for recoils, read recoil, and for expoſes, read expoſe.

Page 21. Sixth Equation, Col. II. at Top, for $\genfrac{}{}{0pt}{}{7}{1}$, read $\genfrac{}{}{0pt}{}{1}{7}$,

Page 27. In the Arguments of both the Equations of Parallax, the Letter S. ſignifying *Sign* is omitted, which the Reader is deſired to ſupply.